Module description Catalog Program in Applied Mathematics

FACULTY OF MATHEMATICS AND COMPUTER SCIENCE

2024

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# **1.** **General Education**

#### 1. Marxist-Leninist Philosophy - BAA00101

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| --- | --- |
| Module designation | Marxist-Leninist Philosophy |
| Semester(s) in which the module is taught | 1st semester |
| Person responsible for the module | Lecturers at School of Political and Administration Sciences,  VNU-HCM |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Do lecturing, teamwork, divide students into groups to solve problems |
| Workload (incl. contact hours, self-study hours) | 135 Hours  Contact hours: Lectures: 45 hours (in class)  Private study: 90 hours (self-study) |
| Credit points | 3 Credits (4.5 ETCS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | The course equips students with the basic contents of the worldview and the Marxist-Leninist philosophical methodology.  Helping students apply knowledge about the worldview, Marxist-Leninist philosophy, and philosophy creatively in cognitive and practical activities, to solve problems that the social life of a country or of the time being set. |
| Content | Marxist-Leninist philosophy is a course in the Marxist-Leninist knowledge block and Ho Chi Minh Thought. This module equips students with basic, general, and systematic knowledge of the problems of Marxist-Leninist philosophy. From there, learners have a basis and reasonable research and learning methods and apply them to the process of evaluating life phenomena. |
| Examination forms | * Class discussion. * Group presentations and reports. * Mid-term exam: essay (opened book). * Final exam: essay (closed book) |
| Study and examination requirements | 1. Regulations for group presentations    1. Forming a group: 5 students/group. The deadline for group topic registration on the forum is session 2 or directly submit it to the lecturer at the exam.    2. Week 4 (4th session) begins to present in order. Note that the presenting groups need to fully show up and bring along all relevant documents.    3. Submission form: submit files and minutes of group work via email to the lecturer. 2. Regulations on time, attendance and discipline in the course: attend class on time and at least 80% of the sessions (only to be absent for a maximum of 20%). Exam ban is applied to those who miss more than the regulated number of sessions. Students must have test scores, lively discussions, constructive and serious statements in class. |
| Reading list | 1. Textbook of basic principles of Marxism-Leninism, National Political Publishing House of Vietnam. 2. Textbook of Marxist-Leninist Philosophy, National Political Publishing House of Vietnam. |

#### 2. Marxist-Leninist Political Economy - BAA00102

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| --- | --- |
| Module designation | Marxist-Leninist Political Economy |
| Semester(s) in which the module is taught | 1st semester |
| Person responsible for the module | Lecturers at School of Political and Administration Sciences, VNU-HCM |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Do lecturing, teamwork, divide students into groups to solve problems |
| Workload (incl. contact hours, self-study hours) | 90 Hours  Contact hours:  Lectures: 30 hours (in class)  Private study: 60 hours (self-study) |
| Credit points | 2 Credits (3 ETCS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | Firstly, equip students with basic and core knowledge of the Marxist-Leninist political economy in the context of economic development of the country and the world today. Ensure the basic, systematic, scientific, updating new knowledge, associate with practice, creativity, skills, thinking, learner quality, connectivity to overcome duplication, enhance integration and reduce the load, reduce content that is no longer relevant or scholastic content for students at non-theoretical colleges and universities.  Second, on that basis, forming thinking and analytical skills, assessing and identifying the nature of economic benefit relations in the country's socio-economic development, contributing to helping students build appropriate social responsibility in the job position and life after graduation.  Third, contribute to building the stance and ideology of Marxism-Leninism towards students. |
| Content | The program consists of six chapters: in which chapter one discusses the objects, research methods, and functions of the Marxist-Leninist Political Economy. Chapters 2 to 6 present the core content of the Marxist-Leninist political economy according to the subject's objectives. Specifically, issues such as goods, markets and the role of actors in the market economy; Producing surplus value in a market economy; Competition and monopoly in the market economy; Socialist-oriented market economy and economic interest relations in Vietnam; Industrialization, modernization, and international economic integration in Vietnam. |
| Examination forms | * Class discussion. * Group presentations and reports. * Mid-term exam: essay (opened book). * Final exam: essay (closed book). |
| Study and examination requirements | 1. Regulations for group presentations:    1. Forming a group: 5 students/group. The deadline for group topic registration on the forum is session 2 or directly submit it to the lecturer at the exam.    2. Week 4 (4th session) begins to present in order. Note that the presenting groups need to fully show up and bring along all relevant documents.    3. Submission form: submit files and minutes of group work via email to the lecturer. 2. Regulations on time, attendance, and discipline in the course: attend class on time and at least 80% of the sessions (only to be absent for a maximum of 20%). Exam ban is applied to those who miss more than the regulated number of sessions. Students must have all test scores, lively discussions, constructive and serious statements in class. |
| Reading list | Mac-Leninist political economy textbook for undergraduates who are not majoring in political economy. |

#### 3. Scientific Socialism - BAA00103

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| --- | --- |
| Module designation | Scientific Socialism |
| Semester(s) in which the module is taught | 2nd semester |
| Person responsible for the module | Lecturers at School of Political and Administration  Sciences, VNU-HCM |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | lecture, lesson, teamwork, divide students into groups to solve problems |
| Workload (incl. contact hours, self-study hours) | 90 Hours  Contact hours:  Lectures: 30 hours (in class)  Private study: 60 hours (self-study) |
| Credit points | 2 Credits (3 ETCS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | The subject equips students with the basic contents of scientific socialism (one of the three components constituting Marxism-Leninism).  Helping students apply basic knowledge of scientific socialism creatively in cognitive and practical activities, solving problems that the social life of a country, of the times being set. |
| Content | The subject equips students with the basic contents of scientific socialism (one of the three components constituting Marxism-Leninism). Helping students apply basic knowledge of scientific socialism creatively in cognitive and practical activities, solving problems that the social life of a country, of the times being set. |
| Examination forms | * Class discussion. * Group presentations and reports. * Mid-term exam: essay (opened book). * Final exam: essay (closed book). |
| Study and examination requirements | 1. Regulations for group presentations    1. Forming a group: 5 students/group. The deadline for group topic registration on the forum is session 2 or directly submit it to the lecturer at the exam.    2. Week 4 (4th session) begins to present in order. Note that the presenting groups need to fully show up and bring along all relevant documents.    3. Submission form: submit files and minutes of group work via email to the lecturer. 2. Minimum attendance at lectures is 80% (Absences must not exceed 3 times for the entire duration of the lectures) |
| Reading list | 1. Textbook of Scientific Socialism, National Political Publishing House of Vietnam. 2. The Basic Principles of Marxism-Leninism, National Political Publishing House of Vietnam. |

#### 4. History of Vietnamese Communist Party - BAA00104

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| --- | --- |
| Module designation | History of Vietnamese Communist Party |
| Semester(s) in which the module is taught | 2nd semester |
| Person responsible for the module | Lecturers at School of Political and Administration  Sciences, VNU-HCM |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lecture, lesson, teamwork, divide students into groups to solve problems |
| Workload (incl. contact hours, self-study hours) | 90 Hours  Contact hours:  Lectures: 30 hours (in class)  Private study: 60 hours (self-study) |
| Credit points | 2 Credits (3 ETCS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | In terms of content: providing systematic and basic knowledge about the birth of the Communist Party of Vietnam (1920-1930), the Party's leadership over the Vietnamese revolution during the period of political struggle. government authority (1930-1945), in two resistance wars against French colonialism and American imperialism (1945-1975), in the cause of national construction and defense during the country's transition to socialism. association, conducting renovation work (1975-2018).  Ideologically: Through historical events and experiences on the leadership of the Party to build a sense of respect for objective truths, raise pride and confidence in the Party's leadership cause.  About skills: Equipping with scientific thinking methods on history, skills in choosing research materials, studying subjects and the ability to apply historical awareness to practical work, criticizing misconceptions on the history of the Party. |
| Content | The course provides systematic and fundamental knowledge about the birth of the Communist Party of Vietnam (19201930), the Party's leadership for the Vietnamese revolution during the period of struggle for power ( 1930-1945), during the two resistance wars against the French colonialists and the American imperialists (1945-1975), in the cause of national construction and defense during the period of the whole country's transition to socialism, conducted doi moi (1975-2018). Through historical events and experiences in the leadership of the Party to build a sense of respect for objective truth, heighten pride and confidence in the Party's leadership cause. Equip with scientific thinking methods on history, skills in choosing research materials, studying subjects, and the ability to apply historical awareness to practical work, and criticize misconceptions about the history of the Party. |
| Examination forms | * Class discussion. * Group presentations and reports. * Mid-term exam: essay (opened book). * Final exam: essay (closed book). |
| Study and examination requirements | 1. Regulations for group presentations    1. Forming a group: 5 students/group. The deadline for group topic registration on the forum is session 2 or directly submit it to the lecturer at the exam.    2. Week 4 (4th session) begins to present in order. Note that the presenting groups need to fully show up and bring along all relevant documents.    3. Submission form: submit files and minutes of group work via email to the lecturer. 2. Regulations on time, attendance and discipline in the course: attend class on time and at least 80% of the sessions (only to be absent for a maximum of 20%). Exam ban is applied to those who miss more than the regulated number of sessions. Students must have test scores, lively discussions, constructive and serious statements in class. |
| Reading list | Curriculum of the History of the Communist Party of  Vietnam, Issued by the Ministry of Education and Training. |

#### 5. Ho Chi Minh’s Ideology - BAA00003

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| --- | --- |
| Module designation | Ho Chi Minh’s Ideology |
| Semester(s) in which the module is taught | 4th semester |
| Person responsible for the module | Lecturers at School of Political and Administration  Sciences, VNU-HCM |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lecture, lesson, teamwork, divide students into groups to solve problems |
| Workload (incl. contact hours, self-study hours) | 90 Hours  Contact hours:  Lectures:30 hours (in class)  Private study: 60 hours (self-study) |
| Credit points | 2 Credits (3 ETCS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | About knowledge: Equip students with basic knowledge about the concept, origin, the process of formation and development of Ho Chi Minh thought; the basic contents of Ho Chi Minh's thought; the application of the Communist Party of Vietnam in the national-democratic revolution and the socialist revolution, in the current national renewal process.  About skills: Helping students to think, analyze, evaluate, and creatively apply Ho Chi Minh's Thoughts to solve problems in real life, study, and work.  About attitudes: Helping students improve their political bravery, patriotism, loyalty to the goal, the ideal of national independence associated with socialism; aware of the role and value of Ho Chi Minh's thought for the Vietnamese Party and nation; realize their responsibility in studying and training to contribute to the construction and defence of the country. |
| Content | Description of course content: the subject equips students with basic knowledge about objects, research methods, and learning meanings of Ho Chi Minh's ideology; on the basis, of the process of formation and development of Ho Chi Minh thought; on national independence and socialism; on the Communist Party and the State of Vietnam; on great national and international solidarity; about culture, ethics, people. |
| Examination forms | * Class discussion. * Group presentations and reports. * Mid-term exam: Multiple choice (closed-book) or essay (opened-book). * Final exam: Essay (opened book). |
| Study and examination requirements | 1. Regulations for group presentations    1. Forming a group: 5 students/group. The deadline for group topic registration on the forum is session 2 or directly submit it to the lecturer at the exam.    2. Week 4 (4th session) begins to present in order. Note that the presenting groups need to fully show up and bring along all relevant documents.    3. Submission form: submit files and minutes of group work via email to the lecturer. 2. Regulations on time, attendance, and discipline in the course: attend class on time and at least 80% of the sessions (only to be absent for a maximum of 20%). Exam ban is applied to those who miss more than the regulated number of sessions. Students must have test scores, lively discussions, constructive and serious statements in class. |
| Reading list | 1. Textbook of Ho Chi Minh's Thoughts, National Political Publishing House of Vietnam. 2. Study Guide for Ho Chi Minh's Thoughts, Ho Chi Minh City National University Publishing House. |

#### 6. General Law - BAA00004

|  |  |
| --- | --- |
| Module designation | General Law |
| Semester(s) in which the module is taught | 1st semester |
| Person responsible for the module | Lecturers at School of Political and Administration  Sciences, VNU-HCM |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lectures, seminars |
| Workload (incl. contact  hours, self-study hours) | Total workload: 135 hrs  Contact hours (lectures): 45 hrs  Private study including examination preparation, specified in hours: 90 hrs |
| Credit points | 3 (4.5 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | After completing the course, students will be able to:   1. General Objective: Understand the basic legal concepts and terms related to the country's legal system and state apparatus; apply legal provisions to solve some simple case studies; help students form and develop some skills such as looking up legal documents, analyzing legal regulations, and working in groups, thereby improving their sense of survival, learning and working following the Constitution and regulations. The law, the right behavior orientation in life. 2. Specific objectives/course output standards:    1. Knowledge: Present basic legal concepts and terms related to the state apparatus and the Vietnamese legal system; Solve some exercise cases based on the provisions of a law book in the legal system of Vietnam.    2. Skills: Analyzing legal regulations; Lookup legal documents; Working group.    3. Attitude, diligence: Raise awareness of living, studying, and working following the Constitution and the law. |
| Content | The module provides knowledge about the structure of the State apparatus as well as the functions, authority, and legal status of agencies in the State apparatus of the Socialist Republic of Vietnam in terms of economic management, Legal nature, and structure of the system of legal documents. From an overview of the system of legal branches in our State's legal system, a course is devoted to studying the basic contents of administrative law, civil law, and criminal law as branches of law. the main law (original branches of law) of the legal system, so that learners can easily access themselves to other branches of law arising from these major branches of law. |
| Examination forms | Written exam, Multiple choices, Oral presentation |
| Study and examination  requirements | Minimum attendance at lectures is 80% Final score is greater or equal to 5.0/10.0 |
| Reading list | 1. General Law textbook, Ho Chi Minh City University of Law. 2. Textbook of Theory of State and Law, Hanoi University of Law. |

#### 7. General Economics - BAA00005

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| --- | --- |
| Module designation | General Economics |
| Semester(s) in which the module is taught | 2nd semester |
| Person responsible for the module | MSc. Le Nhan My |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Lecture |
| Workload (incl. contact  hours, self-study hours) | (Estimated) Total workload: 90 hours.  Contact hours (lecture): 30 hours.  Private study including examination preparation, specified in hours: 60 hours. |
| Credit points | 2 Credits (3 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | 1. Knowledge:    1. Forming and developing (one step) capacity to collect information, skills to synthesize and systematize issues in an overall relationship; skills to compare, analyze, comment, and evaluate micro-economic issues.    2. Grasp the basic content of Microeconomics - a part of economics. 2. Specifically:    1. Understand the theory of economic choice, the influence of the law of scarcity, and economic models on economic choice.    2. Understand the theory of supply and demand.    3. Understand the theory of consumer behavior.    4. Understand the theory of producer behavior.    5. Understand the theory of competition and monopoly.    6. Understand the theory of factor markets.    7. Understand the theory of the role of government.    8. Understand the analysis of the influence of factors on the balance of the market, in terms of skills.    9. Having the ability to apply the knowledge learned to study the nature of economic phenomena, the laws, and trends of the phenomena, and the laws of the market economy.    10. Ability to apply the knowledge learned in the study of macroeconomics, development economics, and several other economic subjects. 3. Skills:    1. Forming and developing (one step) capacity to collect information, skills to synthesize and systematize issues in an overall relationship; skills to compare, analyze, comment, and evaluate micro-economic issues.    2. Develop reasoning and public speaking skills. Attitude:    3. Trying to be righteous in recognizing and evaluating the lines, policies, and laws of the State of Vietnam in the development of the market economy with the state's regulation. 4. Other Objectives:    1. Through presentations and problem-solving. Forming and developing collaboration and teamwork skills.    2. Develop skills of creative thinking, discovery, and discovery.    3. Cultivate and develop assessment and self-assessment capacity.    4. Develop public speaking and commenting skills. |
| Content | The course presents some basic problems of economics; principles of economics, supply and demand patterns and market equilibrium; theory of consumer behavior and business behavior; types of markets; aggregate supply, aggregate demand, and measure national output.  The module includes the following chapters:  Chapter 1: Economics and Fundamental Issues  Chapter 2: Markets, Supply and Demand, and Market  Equilibrium  Chapter 3: Theory of Consumer Behavior  Chapter 4: Production Cost Theory and Profit Maximization Chapter 5: National Output Measurement, Inflation, and Unemployment |
| Examination forms | Homework: 20%.  Midterm exam: 20%.  Final exam: 60%. |
| Study and examination requirements | Regulations on time, attendance, and discipline in the course: attend class on time and at least 70% of the sessions (only to be absent for a maximum of 30%). Exam ban is applied to those who miss more than the regulated number of sessions. Students must have all test scores, lively discussions, constructive and serious statements in class. |
| Reading list | None |

#### 8. Psychology - BAA00006

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| --- | --- |
| Module designation | Psychology |
| Semester(s) in which the module is taught | 2nd semester |
| Person responsible for the module | MSc. Tran Huong Thao |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Do lecturing, teamwork, divide students into groups to solve problems |
| Workload (incl. contact  hours, self-study hours) | (Estimated) Total workload: 90 hours.  Contact hours (lecture): 30 hours.  Private study including examination preparation, specified in hours: 60 hours. |
| Credit points | 2 Credits (3 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | Knowledge:   1. Understand the system of basic concepts of psychological science and research methods in psychology. 2. Understand the origin, formation and development of psychology and consciousness. 3. Understand the nature of human psychological processes: perception; emotion - affection; act. 4. Identify human psychological states. 5. Understand the psychological attributes that make up the personality structure. Understand the factors affecting the formation and development of personality.   Skills:   1. Developing the capacity to study documents: Analyze, synthesize, compare, and generalize. 2. Formation and developing the ability to identify psychological phenomena and apply learned knowledge to solve practical problems. 3. Consulting and consulting skills.   Attitude:   1. Cultivate a passion for learning and studying subjects. 2. Forming a sense of initiative and positivity in self-study. 3. Formation the right motivation in learning. 4. Raise a sense of responsibility for group activities.   Other goals:   1. Forming personality qualities in accordance with the requirements of the integration period. 2. Forming communication and behavioral skills in the community. 3. Forming a modern and scientific way of living and working. 4. Forming and developing the ability to think creatively, independently, and critically. 5. Reasoning skills, public speaking skills. 6. Form and develop teamwork skills. |
| Content | The course introduces learners to acquire basic knowledge about the nature and characteristics of psychological phenomena and basic psychological laws of humans (perception, emotion, will, etc.) actions and personalities...). On that basis, it helps learners to apply knowledge in practice to identify and distinguish basic psychological phenomena in humans.  This module includes the following parts:  Part 1: The Natural Basis and Social Foundation of Human Psychology.  Part 2: Perception and Learning.  Part 3: Emotions - Affections.  Part 4: Personality and the Formation of Personality.  Part 5: Deviations in Individual Psychological Behavior and Correcting Such Deviant Behavior. |
| Examination forms | * Class discussion; Group presentations and reports. * Mid-term exam: essay (opened book). * Final exam: essay (closed book). |
| Study and examination  requirements | Regulations on time, attendance, and discipline in the course: attend class on time and at least 70% of the sessions (only to be absent for a maximum of 30%). Exam ban is applied to those who miss more than the regulated number of sessions. Students must have all test scores, lively discussions, constructive and serious statements in class. |
| Reading list | Main textbook:   1. Nguyễn Quang Uẩn (2015). Giáo trình Tâm lý học đại cương.   References:   1. Plotnik, R, Kouyoumdjian, H (2011). Introduction to Psychology. 2. Berstein, D. A., Penner, L. A., Clarke-Stewart, A., and Roy, E (2008). Psychology. |

#### 9. Group-working and Learning Skills – BAA00008

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| --- | --- |
| Module designation | Group-working and Learning Skills |
| Semester(s) in which the module is taught | 2nd semester |
| Person responsible for the module | MSc. Tran Huong Thao |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Do lecturing, teamwork, divide students into groups to solve problems |
| Workload (incl. contact hours, self-study hours) | Total: 60 hours  Contact hours: lectures 30 hours (in-class).  Private study: 30 hours (self-study). |
| Credit points | 2 Credits (3 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | General objectives:   1. Specific objectives/subject output standards: Equip students with knowledge and skills about teamwork and study skills. Bringing career orientations to group work practice topics. 2. Skills: teamwork, presentation, communication 3. Attitude, diligence: serious, diligent, positive |
| Content | Understand the concept of groups, how to form groups, classify groups, functions, and tasks of group members. Know the process of teamwork, the necessary skills when working in groups. Able to plan and execute projects. Understand and apply learning skills. |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | 1. Thuật lãnh đạo nhóm, NXB Trẻ. 2. Học tập cũng cần chiến lược, NXB Lao động Xã hội |

#### 10. English 1 - BAA00011

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| Module designation | English 1 |
| Semester(s) in which the module is taught | 1st semester |
| Person responsible for the module | Lecturers at Foreign language centre of University of Science, VNU-HCM |
| Language | English |
| Relation to curriculum | Compulsory |
| Teaching methods | Do lecturing, teamwork, divide students into groups to solve problems |
| Workload (incl. contact hours, self-study hours) | Total: 120 hours.  Contact hours: lectures 30 hours; 30 exercise hours  Private study: 60 hours (self-study) |
| Credit points | 3 Credits (5 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | Upon completing this course, learners will enhance their basic knowledge of general English of vocabulary and grammar in four skills: Listening, Speaking, Reading, and Writing. Here are the objectives in detail:   1. Learners will be able to understand and use vocabulary in various topics such as leisure activities, important life events, emotion, attitude, physical appearance description, travel plans, presenting dreams, countries, people, and languages. 2. Learners can understand and use grammar structures at the pre-intermediate level such as basic tenses and other related matters. 3. Learners will be able to choose the answer that best describes the given picture, choose the correct response to the questions, and understand dialogues and short monologues. 4. Learners will be able to pronounce single words, word clusters and sentences, describe a given picture, and build basic communications in daily life. 5. Learners will be able to comprehend 300-500 words passage of familiar topics and gain more knowledge of different cultures around the world. 6. Learners can write essays about familiar topics related to daily life, learning activities, entertainment, events, etc. |
| Content | This course is designed for non-English major students at the University of Science - Vietnam National University - Hochiminh City, using the first eight modules in the book New Cutting Edge (Pre-intermediate). These modules cover vocabulary, grammar, reading, listening, speaking, and writing in a wide range of topics such as leisure activities, important life events, feelings and emotions, attitudes, physical appearance descriptions, travel plans, presenting dreams, countries, people, and languages. Students need to complete various tasks, including presentations, debates, role-plays, assignments, tests and so on. |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | 1. Sarah Cunningham, Peter Moor, Jane Cornyns Carr (2005). New Cutting Edge, pre-intermediate: student's book. Harlow: Pearson Education. 2. Sarah Cunningham, Peter Moor, Jane Cornyns Carr (2005). New Cutting Edge, pre-intermediate: workbook. Harlow: Pearson Education. |

#### 11. English 2 - BAA00012

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| Module designation | English 2 |
| Semester(s) in which the module is taught | 2nd semester |
| Person responsible for the module | Lecturers at Foreign Language Centre of University of Science, VNU-HCM |
| Language | English |
| Relation to curriculum | Compulsory |
| Teaching methods | Do lecturing, teamwork, divide students into groups to solve problems |
| Workload (incl. contact hours, self-study hours) | Total: 120 hours.  Contact hours: lectures 30 hours; 30 exercise hours  Private study: 60 hours (self-study) |
| Credit points | 3 Credits (5 ECTS) |
| Required and recommended prerequisites for joining the module | English 1 |
| Module objectives/intended learning outcomes | Upon completing this course, learners will enhance their basic knowledge of general English of vocabulary and grammar in four skills: Listening, Speaking, Reading and Writing. Here are the objectives in detail:   1. Learners will be able to understand and use vocabulary in various topics such as everyday items, important life events, holiday plans, health problems, hobbies and interests, personalities, finance- related issues. 2. Learners can understand and use grammar structures in pre-intermediate level such as basic tenses and more complex grammatical structures including conditional sentences, passive, and verb patterns. 3. Learners will be able to choose the correct response for the questions and understand dialogues and short monologues. 4. Learners will be able to pronounce words, generate short conversations, discuss real-life familiar topics, understand, and quickly respond to generated questions, and improve basic communication skills in daily life. 5. Learners will be able to comprehend 500 - 700 words passage of familiar topics and gain more knowledge of different cultures around the world. 6. Learners can write appropriate responses to written requests or complaints in business and social contexts, applying theories into real life practice. |
| Content | This course is designed for non-English major students at the University of Science - Vietnam National University - Ho Chi Minh City, using seven modules (modules 09-15) in the book New Cutting Edge (Pre-intermediate). These modules cover vocabulary, grammar, reading, listening, speaking and writing in a wide range of topics such as everyday items, important life events, holiday plans, health problems, hobbies and interests, personalities, and finance-related issues. Students need to complete various tasks, including presentations, debates, role-plays, assignments, tests and so on. |
| Examination forms | Writing (Midterm: 30%, Final exam: 70%) |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | 1. Sarah Cunningham, Peter Moor, Jane Cornyns Carr (2005). New Cutting Edge, pre-intermediate: student's book. Harlow: Pearson Education. 2. Sarah Cunningham, Peter Moor, Jane Cornyns Carr (2005). New Cutting Edge, pre-intermediate: workbook. Harlow: Pearson Education. |

#### 12. English 3 - BAA00013

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| Module designation | English 3 |
| Semester(s) in which the module is taught | 3rd semester |
| Person responsible for the module | Lecturers at Foreign Language Centre of University of Science, VNU-HCM |
| Language | English |
| Relation to curriculum | Compulsory |
| Teaching methods | Do lecturing, teamwork, divide students into groups to solve problems |
| Workload (incl. contact hours, self-study hours) | Total: 120 hours.  Contact hours: lectures 30 hours; 30 exercise hours.  Private study: 60 hours (self-study) |
| Credit points | 3 Credits (5 ECTS) |
| Required and recommended prerequisites for joining the module | English 2 |
| Module objectives/intended learning outcomes | Upon completing this course, learners will enhance their basic knowledge of general English of vocabulary and grammar in four skills: Listening, Speaking, Reading and Writing. Here are the objectives in detail:   1. Learners will be able to understand and use vocabulary in various topics such as leisure activities, important life events, emotion, attitude, physical appearance description, travel plans, dreams, countries, people, and languages. 2. Learners can understand and use new language in a natural, communicative way. 3. Learners will be able to present their opinions about some social and cultural issues and understand dialogues and talks. Learners will be able to comprehend 500-700 words passages of familiar topics and gain more knowledge of different cultures around the world. 4. Learners can write paragraphs about familiar topics related to daily life, learning activities, entertainment, events, etc. |
| Content | This course is designed for non-English majors at the University of Science - Vietnam National University - Ho Chi Minh City, using the first six modules in the book New Cutting Edge (Intermediate). These modules cover vocabulary, grammar, reading, listening, speaking and writing in a wide range of topics, namely leisure activities, important life events, feelings and emotions, attitudes, physical appearance descriptions, travel plans, presenting dreams, countries, people, and languages. Students need to complete various tasks, including presentations, debates, role-plays, doing homework, tests and so on. |
| Examination forms | Writing (Midterm: 30%, Final exam: 70%) |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | 1. Sarah Cunningham, Peter Moor, Jane Cornyns Carr (2005). New Cutting Edge, pre-intermediate: student's book. Harlow: Pearson Education. 2. Sarah Cunningham, Peter Moor, Jane Cornyns Carr (2005). New Cutting Edge, pre-intermediate: workbook. Harlow: Pearson Education. 3. Materials prepared by the lecturer |

#### 13. English 4 - BAA00014

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| Module designation | English 4 |
| Semester(s) in which the module is taught | 4th semester |
| Person responsible for the module | Lecturers at Foreign Language Centre of University of Science, VNU-HCM |
| Language | English |
| Relation to curriculum | Compulsory |
| Teaching methods | Do lecturing, teamwork, divide students into groups to solve problems |
| Workload (incl. contact hours, self-study hours) | Total: 120 hours.  Contact hours: lectures 30 hours; 30 exercise hours.  Private study: 60 hours (self-study) |
| Credit points | 3 Credits (5 ECTS) |
| Required and recommended prerequisites for joining the module | English 3 |
| Module objectives/intended learning outcomes | Upon completing this course, learners will enhance their intermediate knowledge of general English of vocabulary and grammar in four skills: Listening, Speaking, Reading and Writing. Here are the objectives in detail:   1. Learners can understand and use the language needed in more complex real-life situations in a natural, communicative way. Learners will be able to express their own ideas in interviews, mini-talks, problem-solving and storytelling. 2. Learners will be able to comprehend 700-1000 words passages of up-to-date topics of international interest and learn more about the world and other cultures. 3. Learners can write essays about familiar topics related to daily life, learning activities, entertainment, events, etc. |
| Content | This course is designed for non-English majors at the University of Science - Vietnam National University - Ho Chi Minh City, using six modules (modules 07-12) in the book New Cutting Edge (Intermediate). These modules cover vocabulary, grammar, reading, listening, speaking and writing in a wide range of topics namely everyday items, important life events, holiday plans, health problems, hobbies and interests, personalities, and finance-related issues. Students need to complete various tasks, including presentations, debates, role-plays, doing homework, tests and so on. |
| Examination forms | None |
| Study and examination requirements | Mid-term test: 50%  Final test: 50% |
| Reading list | 1. Sarah Cunningham, Peter Moor, Jane Cornyns Carr (2005). New Cutting Edge, Intermediate: student's book. Harlow: Pearson Education. 2. Sarah Cunningham, Peter Moor, Jane Cornyns Carr (2005). New Cutting Edge, Intermediate: workbook. Harlow: Pearson Education. 3. Materials prepared by the lecturer (2012). Collins Skills for the TOEIC test: Speaking and Writing. Harper Collins UK. |

#### 14. Analysis 1A – MTH00010

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| Module designation | Analysis 1A |
| Semester(s) in which the module is taught | 1st semester |
| Person responsible for the module | Dr. Ong Thanh Hai |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lectures, group work, small group solving exercises |
| Workload (incl. contact hours, self-study hours) | 150 Hours  Contact hours: lectures: 30 hours (in class); 30 exercise hours  Private study: 90 hours (self-study) |
| Credit points | 3 Credits (5 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | The objective of the module is to equip students with the basic knowledge of the foundation of calculus as the foundation for specialized modules. |
| Content | The course covers the basics of real numbers, sequences and series of real numbers. |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | 1. Mathematica by example, Academic Press, New York 2. Calculus, Harcourt Brace College Publishers, New York 3. Giáo trình Giải tích 1. Nhà xuất bản Thống Kê, Tp Hồ Chí Minh |

#### 15. Calculus 1A – MTH00011

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| Module designation | Calculus 1A |
| Semester(s) in which the module is taught | 1st semester |
| Person responsible for the module | MSc. Nguyen Vu Huy |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lectures, group work, small group solving exercises |
| Workload (incl. contact hours, self-study hours) | 150 Hours  Contact hours:  Lectures: 30 hours (in class); 30 exercise hours  Private study: 90 hours (self-study) |
| Credit points | 3 Credits (5 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | The objective of the module is to equip students with the basic knowledge of calculus as the foundation for specialized modules. |
| Content | The course covers the basics of continuity, limit, derivative, Riemann integral. |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | 1. Mathematica by example, Academic Press, New York 2. Calculus, Harcourt Brace College Publishers, New York 3. Giáo trình Giải tích 1. Nhà xuất bản Thống Kê, Tp Hồ Chí Minh |

#### 16. Analysis 2A - MTH00012

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| Module designation | Analysis 2A |
| Semester(s) in which the module is taught | 3rd semester |
| Person responsible for the module | Dr. Ong Thanh Hai |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lectures, group work, small group solving exercises |
| Workload (incl. contact hours, self-study hours) | 150 Hours  Contact hours: lectures: 30 hours (in class); 30 exercise hours  Private study: 90 hours (self-study) |
| Credit points | 3 Credits (5 ECTS) |
| Required and recommended prerequisites for joining the module | Analysis 1A |
| Module objectives/intended learning outcomes | General objective: To introduce the basic concepts and techniques of metric topology for multivariable functions and vectors.  Specific objectives:   1. Knowledge: know the basic concepts of metrics, closed, open, compact sets, completeness, series in normed space. 2. Skills: do exercises that demonstrate the above concepts and their applications |
| Content | This module helps students understand basic topological concepts, understand convergence in multi-dimensional spaces and function spaces. The course introduces metric spaces, normative spaces and Rn; properties of continuous functions on metric spaces. Completeness of spaces and series on complete normed space. This knowledge forms the basis for all specializations such as analysis, statistics and probability, computer science, optimization, and applied mathematics. |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Assignments: 20%, Midterm Exam: 30%, Final Exam: 50% |
| Reading list | Giáo Trình Giải tích A2, NXB ĐHQG Tp HCM, Đặng Đức Trọng, Đinh Ngọc Thanh, Phạm Hoàng Quân |

#### 17. Calculus 2A – MTH00013

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| Module designation | Calculus 2A |
| Semester(s) in which the module is taught | 2nd semester |
| Person responsible for the module | Dr. Nguyen Thi Hoai Thuong  Dr. Phan Thi My Duyen |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lectures, group work, small group solving exercises |
| Workload (incl. contact hours, self-study hours) | 150 Hours  Contact hours: lectures: 30 hours (in class); 30 exercise hours  Private study: 90 hours (self-study) |
| Credit points | 3 Credits (5 ECTS) |
| Required and recommended prerequisites for joining the module | Calculus 1A |
| Module objectives/intended learning outcomes | General Objective: To introduce the basic concepts and techniques of differentiable calculus of multivariable vector functions.  Specific objectives:   1. Knowledge: The theory of series of real numbers. Properties of differentiable functions on Rn. 2. Skills: be able to do calculation exercises on the above concepts and their applications |
| Content | This module helps students understand the basic knowledge of differential calculus of multivariable functions, understand bound and unconstrained extremal problems in multidimensional spaces, and understand the concept of series of real numbers. This knowledge forms the basis for all specializations such as analysis, statistics and probability, computer science, optimization, applied mathematics. |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Assignments: 20%, Midterm Exam: 30%, Final Exam: 50% |
| Reading list | Giải tích A2, NXB ĐHQG Tp HCM, Đặng Đức Trọng, Đinh Ngọc Thanh, Phạm Hoàng Quân. |

#### 18. Analysis 3A – MTH00014

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| Module designation | Analysis 3A |
| Semester(s) in which the module is taught | 3rd semester |
| Person responsible for the module | Assoc. Prof. Ly Kim Ha |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lectures, group work, small group solving exercises |
| Workload (incl. contact hours, self-study hours) | 165 Hours  Contact hours: lectures 45 hours + 30 exercises hours (in class)  Private study: 90 hours (self-study) |
| Credit points | 4 Credits (6.5 ECTS) |
| Required and recommended prerequisites for joining the module | Analysis 1A, Calculus 1A, Analysis 2A |
| Module objectives/intended learning outcomes | General objective: Learners understand the integral of functions of many variables and the relationships between the differential and integral of functions of many variables.  Specific objectives:   1. Knowledge: The minimum outcome standard is at the level in J. Stewart's Calculus textbook for science and engineering students. The average level is towards more advanced, more suitable for Mathematics majors, with higher requirements for accuracy and theoretical content. For fairly good students and honor students the course aims for qualifications in the respective sections of classic analysis textbooks such as those of W. Rudin, S. Lang. 2. Skills: Introduction to computer tools. Exercises include both reasoning and calculation. 3. Attitude, diligence: Seeing the need to develop generalization and precision, forming an ability to solve new application problems. Having a serious, proactive and self-disciplined learning attitude. |
| Content | This is a course on Multiple Integration and Vector Calculus. This subject follows the subjects of Calculus 1 and Calculus 2, which is considered a basic knowledge for university level in Science and Technology. A useful course for more advanced investigations of Lebesgue integrals (Measurement and Probability), mathematical models using Integral (in Mechanics, Probability-Statistics, Mathematical Equations, Calculus, ...), and mathematical developments (in Analysis, Geometry, ...) |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Assignments: 20%, Midterm Exam: 30%, Final Exam: 50%.  Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | * 1. Bài giảng Tích phân bội và Giải tích Vectơ, Huỳnh Quang Vũ.   2. Calculus: Early Transcendentals, James Stewart. |

#### 19. Analysis 4A – MTH00015

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| Module designation | Analysis 4A |
| Semester(s) in which the module is taught | 4th semester |
| Person responsible for the module | Dr. Le Anh Ha |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lectures, group work, small group solving exercises |
| Workload (incl. contact hours, self-study hours) | 135 hours  Contact hours: lectures 45 hours (in class)  Private study: 90 hours (self-study) |
| Credit points | 3 Credits (4.5 ECTS) |
| Required and recommended prerequisites for joining the module | Analysis 1A, Analysis 2A. |
| Module objectives/intended learning outcomes | General objective: To introduce basic differential equations and know how to solve basic ordinary differential equations.  Specific objectives/course outcome standards:   1. Knowledge: Master the course content. 2. Skills: Ability to calculate with large numbers of calculations 3. Attitude, diligence: Diligent and serious |
| Content | This module equips math majors with a minimum of background knowledge before entering narrower specializations. The content of this course includes Differential equations of first order; Existence and uniqueness of solutions of Cauchy problem; Linear differential equations of second and higher order; Introduction to the system of differential equations of first order. |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Midterm Exam: 20%, Final Exam: 80% |
| Reading list | 1. Bài giảng Giải tích A4, 2012, Nguyễn Thành Long. 2. Phép tính vi phân hàm nhiều biến và phương trình vi phân, Nguyễn Thành Long, Nguyễn Công Tâm, Lê Thị Phương Ngọc, Nguyễn Anh Triết. |

#### 20. Linear Algebra – MTH00030

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| Module designation | Linear Algebra |
| Semester(s) in which the module is taught | 1st semester |
| Person responsible for the module | Dr. Le Van Luyen  Dr. Bui Anh Tuan |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lectures, group work, small group solving exercises |
| Workload (incl. contact hours, self-study hours) | 135 hours  Contact hours: lectures 45 hours (in class)  Private study: 90 hours (self-study) |
| Credit points | 3 Credits (4.5 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | General objectives: To be familiar with advanced mathematics.  Specific objectives/course learning outcomes:   1. Knowledge: Mastering the knowledge of matrices on number fields and applying them to solving systems of linear equations; determinants and their applications; vector spaces and linear transformations. 2. Skills: Calculating matrices; solving system of linear equations; calculating the coordinates of the vector according to a basis in a finite dimensional vector space; changing when changing the base; representing a linear operator by a matrix; finding the image and the kernel of linear operators; using MAPLE software. 3. Attitude: Attend all classroom sessions; discussions outside of class time. |
| Content | This course is taught in the first semester, initially introducing students to advanced mathematics. Besides equipping new knowledge that is necessary for freshman, this course also provides the foundation knowledge to help students carry out specialized courses. |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Midterm: 40%  Final: 60% |
| Reading list | 1. Đại số tuyến tính và ứng dụng, Tập 1, Bùi Xuân Hải, Trần Ngọc Hội, Trịnh Thanh Đèo, Lê Văn Luyện. 2. Giáo trình Đại số tuyến tính, Ngô Việt Trung. |

#### 21. Abstract Algebra – MTH00031

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| Module designation | Abstract Algebra |
| Semester(s) in which the module is taught | 2nd semester |
| Person responsible for the module | Dr. Trinh Thanh Deo |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lectures, group work, small group solving exercises |
| Workload (incl. contact hours, self-study hours) | 135 hours  Contact hours: lectures 45 hours (in class)  Private study: 90 hours (self-study) |
| Credit points | 3 Credits (4.5 ECTS) |
| Required and recommended prerequisites for joining the module | Linear Algebra |
| Module objectives/intended learning outcomes | The goal of the course is to equip students with basic abstract algebraic structures, to help them become familiar with symbols and formal calculations. |
| Content | The course introduces basic algebraic structures such as groups, rings, integer domains, fields, and polynomial rings on fields. Some special concepts introduced are permutation group, alternating group, cyclic group, polynomial ring on number fields, especially on rational number fields. |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | 1. Nguyễn Viết Đông, Trần Ngọc Hội, Đại số đại cương, NXB ĐHQG TP HCM 2005. 2. Hoàng Xuân Sính, Đại số đại cương, NXB GD, Hà Nội 1997. 3. Nguyễn Hữu Việt Hưng, Đại số đại cương, NXB GD 1998. 4. Mỵ Vinh Quang, Đại số đại cương, NXB GD 1998. 5. Bùi Huy Hiền, Nguyễn Hữu Hoan, Phan Doãn Thoại, Bài tập Đại số và Số học (tập 1, 2), NXB GD 1985. |

#### 22. Fundamentals of Computer Programming – MTH00055

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| Module designation | Fundamentals of Computer Programming |
| Semester(s) in which the module is taught | 2nd semester |
| Person responsible for the module | MSc. Nguyen Hien Luong  MSc. Ha Van Thao |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lectures, group work, small group solving exercises |
| Workload (incl. contact hours, self-study hours) | 165 hours  Contact hours: lectures 45 hours + 30 lab hours (in class)  Private study: 90 hours (self-study) |
| Credit points | 4 Credits (6.5 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | Introduce to students the logic of computer programming – how computers operate with programming languages ​​and how to write instructions using flowchart or pseudocode; how to modularize a computer program; how to write computer programs in C language. |
| Content | 1. Basic concepts of algorithms and algorithms. 2. Describe the skills and fundamentals of computer programming. 3. Introduction to the C programming language. 4. Pointer. 5. Array and string. 6. Function. 7. Structure. |
| Examination forms | Final exam: written exams. |
| Study and examination requirements | Test 1: 15%  Test 2: 15%  Test 3: 20%  Final exam: 50%  Final score is greater or equal to 5.0/10.0 |
| Reading list | 1. Joyce Farrell, Programming Logic & Design Comprehensive 9th Edition, Cengage Learning, 2018. 2. Wilfried Lemahieu, Seppe Vanden Broucke, Bart Baesens, C The Complete Reference, McGraw-Hill, 2000. 3. Phạm Văn Ất, Kỹ Thuật Lập Trình C Cơ sở và Nâng Cao Tái bản lần thứ 6, Giao Thông Vận Tải Hà Nội, 2006. |

#### 23. Linear Algebra Practice – MTH00083

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| Module designation | Linear Algebra Practice |
| Semester(s) in which the module is taught | 1st semester |
| Person responsible for the module | MSc. Pham The Nhan |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lectures, group work, small group solving exercises |
| Workload (incl. contact hours, self-study hours) | 60 hours  Contact hours: 30 lab hours (in class)  Private study: 30 hours (self-study) |
| Credit points | 1 credit (2 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | General objectives: To help students understand more linear algebra via doing exercise.  Specific objectives/course learning outcomes:   1. Knowledge: Mastering the knowledge of matrices on numerical fields and applying them to solving systems of linear equations; determinants and their applications; vector spaces and linear transformations. 2. Skills: Calculating matrices; solving system of linear equations; calculating the coordinates of the vector according to a basis in a finite dimensional vector space; changing when changing the base; representing a linear operator by a matrix; finding the image and the kernel of linear operators; using MAPLE software. 3. Attitude: Attend all classroom sessions; discussions outside of class time. |
| Content | This course is taught in the first year, initially introducing students to advanced mathematics. Besides equipping new knowledge that is necessary for freshman, this course also provides the foundation knowledge to help students carry out specialized courses. |
| Examination forms | Tests – process score: 30%  Midterm exam: 30%  Final exam: 40% |
| Study and examination requirements | Midterm and final exam: written exams. |
| Reading list | 1. Đại số tuyến tính và ứng dụng, Tập 1, Bùi Xuân Hải, Trần Ngọc Hội, Trịnh Thanh Đèo, Lê Văn Luyện. 2. Giáo trình Đại số tuyến tính, Ngô Việt Trung 3. Phạm Huy Điển, Tính toán, lập trình và giảng dạy toán học trên Maple, 2009 |

#### 24. Computational Software Laboratory – MTH00087

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| Module designation | Computational Software Laboratory |
| Semester(s) in which the module is taught | 3rd semester |
| Person responsible for the module | Dr. Ong Thanh Hai |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | lectures, computer practices |
| Workload (incl. contact hours, self-study hours) | 120 hours  Contact hours: 60 lab hours (in class)  Private study: 60 hours (self-study) |
| Credit points | 2 Credits (4 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | Students can use computational programming languages to program calculations in mechanics, analysis, numerical analysis, algebra, statistics… |
| Content | The course covers basic computational programming knowledge using Matlab... Applying this knowledge to write programs to solve problems in mechanics, analysis, numerical analysis, algebra. |
| Examination forms | Tests – process score: 30%  Midterm exam: 30%  Final exam: 40% |
| Study and examination requirements | Midterm and final exam: practical exercises in the laboratory.  Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | 1. Essential MATLAB ® for Engineers and Scientists, 3rd edition, Elsevier Brian D. Hahn and Daniel T. Valentine, 2007. 2. Numerical methods using Matlab. Third Edition. Prentice Hall J. H. Mathews, K. D. Frink, 1999. |

#### 25. Abstract Algebra Practice – MTH00084

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| Module designation | Abstract Algebra Practice |
| Semester(s) in which the module is taught | 2nd semester |
| Person responsible for the module | Dr. Nguyen Kim Ngoc |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | lectures, computer practices |
| Workload (incl. contact hours, self-study hours) | 90 hours  Contact hours: 30 lab hours (in class)  Private study: 60 hours (self-study) |
| Credit points | 1 Credit (2 ECTS) |
| Required and recommended prerequisites for joining the module | Linear Algebra, Linear Algebra Practice |
| Module objectives/intended learning outcomes | General Objective: To equip students with basic computational skills in abstract algebraic structures, formal calculation, giving them a better understanding of these algebraic structures. Use softwares (e.g. GAP) to calculate specific examples and exercises.  Specific objectives/course learning outcomes:   1. Knowledge: Master the theory of basic algebraic structures such as groups, rings, fields, and polynomial rings. Get hands-on with software (e.g. GAP) to better understand the structure learned. 2. Skills: Improve reasoning skill and formal calculation. 3. Attitude, diligence: Serious, progressive. |
| Content | The goal is to practice basic computational skills on algebraic structures such as groups, rings, integral domains, and fields, and use software (e.g. GAP) to better understand the structure of theories learned. |
| Examination forms | Tests – process score: 30%  Midterm exam: 30%  Final exam: 40% |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | 1. Đại số đại cương, Nguyễn Viết Đông, Trần Ngọc Hội, 2005. 2. Đại số đại cương, Hoàng Xuân Sính, 1997. 3. Abstract Algebra in GAP, Alexander Hulpke 2011. |

#### 26. General Environment – ENV00001

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| Module designation | General Environment |
| Semester(s) in which the module is taught | 2nd semester |
| Person responsible for the module | Lecturers at Faculty of Environment, University of Science , VNU-HCM |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Lecture |
| Workload (incl. contact hours, self-study hours) | 90 hours  Contact hours: lectures 30 hour (in class)  Private study: 60 hours (self-study) |
| Credit points | 2 Credits (3 ECTS) |
| Required and recommended prerequisites for joining the  module | None |
| Module objectives/intended learning outcomes | This is a compulsory subject in the general knowledge block in the training program for students of all disciplines. The focus of this module is to provide basic knowledge of Environmental Science: concepts, classification of resources, environment, basic problems and core of the environment. Students are also introduced to measures to protect the environment, conserve resources towards the goal of sustainable development. |
| Content | Chapter 1: Overview of the Environment  General concepts of environment  Basic composition of the environment (volumes)  Chapter 3: Natural Resources  Definition  Classification  General issues of natural disaster  Chapter 4: Human Impact on the environment  History of human impact on the environment  Human impact on environmental components  Chapter 5: Environmental issues and sustainable development  5.1 Population and environment  5.2 Environmental pollution  5.3 Climate change  5.4 Sustainable development  Chapter 6: Environmental management and Environmental Education |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Midterm test: 30% Final test: 70% |
| Reading list | Textbooks:   * + - 1. Lecture on General Environment, compiled by the group of teachers.       2. Le Van Khoa (Editor), 2004. Environmental science, Education Publishing House.   References   1. Le Van Khoa, Doan Van Canh, Nguyen Quang Hung, Lam Minh Triet (2011). Textbook of People and the Environment, Education Publishing House. 2. Goudie, A. (2006) The Human Impact on Natural. 3. Environment. 6th Edition. Oxford. Blackwell. 4. Le Thi Thanh Mai (2008), Textbook of People and the Environment. National University of Ho Chi Minh City. |

#### 27. Human and Environment - ENV00003

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| Module designation | Human and Environment |
| Semester(s) in which the module is taught | 2nd semester |
| Person responsible for the module | MSc. Le Cong Man (Faculty of Biology and Biotechnology, University of Science, VNU-HCM) |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Lecture, disscusion |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 30  Contact hours (please specify whether lecture, exercise, laboratory session, etc.):  - Lecture hours: 30  - Practical hours: 0  - Exercise hours: 0  - Extra-contact hours per week:  Private study including examination preparation, specified in hours:  hours |
| Credit points | 2 Credits (3 ECTS) |
| Required and recommended prerequisites for joining the module | Required prerequisites: General Biology  Recommended prerequisites: 0 |
| Module objectives/intended learning outcomes | Providing students with knowledge about humans' relationship with nature, including inanimate factors and other living things around humans  Knowledge: knowing the position, tasks, and roles of humans in the ecosystem.  Skills: recognizing results from human activities and impacts on natural and social life.  Attitude, Diligence  Able to practice soft skills (teamwork, presentations) |
| Content | Part 1: The formation of human community and society  Chapter 1: Introduction  Chapter 2: Ecological factors  Chapter 3: Population - biome - ecosystem  Chapter 4: People and the environment  Chapter 5: History of human impact on the environment  Part 2: Needs and products in human society  Chapter 6: Essential human needs  Chapter 7: Resources  Chapter 8: Pollution  Chapter 9: Environmental protection and sustainable development  Chapter 10: Cultural and legal issues.  Part 3: Observe and identify (from an ecological point of view) ongoing phenomena affecting the lives of humans and other living things |
| Examination forms | Mini projects |
| Study and examination requirements | Study Requirements: 0  Examination Requirements:   1. Discuss 2. Teamwork 3. Seminar 4. Learning attitude 5. Final exam |
| Reading list | 1. Phạm Xuân Hậu (1997). Con người và môi trường. NXB Giáo dục. 2. Lê Văn Khoa (chủ biên) (2002). Khoa học môi trường. NXB Giáo dục. 3. Nguyễn Hữu Nhân, Hoàng Quý Tình (2011). Sinh thái học người. NXB Giáo dục. |

#### 28. Earth Science – GEO00002

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| Module designation | Earth Science |
| Semester(s) in which the module is taught | 2nd semester |
| Person responsible for the module | Lecturers at Faculty of Geology, University of Science, VNU-HCM |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Lecture |
| Workload (incl. contact hours, self-study hours) | Total: 60 hours.  Contact hours: 30 lectures hours (in class)  Private study: 30 hours (self-study) |
| Credit points | 2 Credits (3 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | Earth Science introduces general knowledge about the Earth related to the rights of the Earth, inside and outside the Earth including position and operation of the earth in space; composition and structure of the atmosphere, wind, and weather, climate, climate change; distribution of freshwater in hydrosphere, sea and ocean behaviour, El Nino-La Nina phenomena: Geosphere: composition and structure of the earth's crust, weathering, erosion-accumulation, landslides, the internal structure of the earth, earthquakes, volcanoes, plate tectonic activities; learn about the history of the earth through the record of fossil remains. Knowledge of Earth science is a necessary basis for understanding the natural environment of the Earth. |
| Content | 1. Presentation on deformations of the earth's crust and earthquake, volcanic activities and membrane tectonic mechanism. 2. Learn about Earth's history through fossil and stratigraphic records. 3. Apply this knowledge to explain some issues in the main profession. 4. Skilled in group discussion, presentation and criticism Attitude, diligence: enthusiasm, honesty in learning; Serious and honest in checking. |
| Examination forms | Writing (Midterm: 30%, Final exam: 70%) |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | * + - 1. Earth Science, DANIELSON, E.W., DENECKE. EJ. Ir. 1986.       2. Foundations of Earth Science, Lutgens Frederick K. Tarbuck Edward, 1, 1997.       3. Earth Science Textbook, LUU DUC HAI, TRAN NGHI. 2008. |

#### 29. General Chemistry 1 – CHE00001

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| --- | --- |
| Module designation | General Chemistry 1 |
| Semester(s) in which the module is taught | 3rd semester |
| Person responsible for the module | Lecturers at Faculty of Chemistry, University of Science, VNU-HCM |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Do lecturing, teamwork, divide students into groups to solve problems |
| Workload (incl. contact hours, self-study hours) | 150 Hours  Contact hours: Lectures: 30 hours (in class) Exercise: 30 hours  Private study: 90 hours (self-study) |
| Credit points | 3 Credits (5 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | This subject is the first Chemistry subject for students of Chemistry and Materials Science. The subject deals with the theoretical foundations of Chemistry related to the basic models of the atomic structure, the periodic changes in the properties of chemical elements, the fundamental forces of interaction in the matter, and the influence of chemical elements. their influence on the properties of matter in the solid, liquid, and gaseous states. |
| Content | 1. Describe the structure of atoms and molecules. 2. Explain periodic changes in some properties of chemical elements. 3. Identify and distinguish basic types of chemical bonds. 4. Identify and explain the relationship between the fundamental forces of interaction in matter and the physical properties of matter. |
| Examination forms | Written exam  Midterm test: 30%  Final test: 70% |
| Study and examination requirements | Minimum attendance at lectures is 80% Final score is greater or equal to 5.0/10.0 |
| Reading list | Textbooks:   1. Nguyen Dinh Chi (2007). General chemistry. Hanoi Education Publishing House 2. Nguyen Dinh Soa (2000). General chemistry. Ho Chi Minh City National University Publishing House 3. Petrucci, R.H; Harwood, W.S; Herring, F.G (2002, 8th Ed.). General Chemistry. USA: Prentice Hall   Others:  Le Thi So Nhu. Summary of General Chemistry lecture - internal documents (For internal circulation only) |

#### 30. General Chemistry 2 – CHE00002

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| Module designation | General Chemistry 2 |
| Semester(s) in which the module is taught | 3rd semester |
| Person responsible for the module | Lecturers at Faculty of Chemistry, University of Science, VNU-HCM |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Do lecturing, teamwork, divide students into groups to solve problems |
| Workload (incl. contact hours, self-study hours) | 150 Hours  Contact hours: Lectures: 30 hours (in class) Exercise: 30 hours  Private study: 90 hours (self-study) |
| Credit points | 3 Credits (5 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | Introduce students to the facts, concepts, and vocabulary of chemistry that will enable them to make informed decisions on issues that involve chemical concepts. Give opportunity to use the scientific method to formulate explanations for events in the natural world. Explore the role of measurement in the development of these explanations and the use of logic to test the validity of claims. Show relationships of chemistry to other disciplines, such as mathematics and the biological sciences. Demonstrate the application of chemistry concepts in the everyday world. Give opportunity to apply learned concepts in new situations of both practical and theoretical significance. Give opportunity to read selected scientific materials and apply appropriate language to describe and analyze scientific events. Develop students’ scientific problem-solving skills through sequential, mathematically oriented assignments. |
| Content | The contents are chemical thermodynamics, chemical kinetics, general chemical equilibria, acid and base equilibria, pH, buffers, ionic compound solubility and equilibria electrochemistry. |
| Examination forms | Written exam  Midterm test: 35%  Quiz or Assignment: 15%  Final test: 50% |
| Study and examination requirements | Minimum attendance at lectures is 80% Final score is greater or equal to 5.0/10.0 |
| Reading list | Ralph H. Petrucci, F. G. Herring, J. Madura, C. Bissonnette (2011), General Chemistry, Principles and Modern Applications, Pearson Canada, 10nd Edition. |

#### 31. General Chemistry Laboratory 1 – CHE00081

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| --- | --- |
| Module designation | General Chemistry Laboratory 1 |
| Semester(s) in which the module is taught | 3rd semester |
| Person responsible for the module | Lecturers at Faculty of Chemistry, University of Science, VNU-HCM |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Do lecturing, teamwork, divide students into groups to solve problems |
| Workload (incl. contact hours, self-study hours) | 90 Hours  Contact hours: Exercise: 60 hours  Private study: 30 hours (self-study) |
| Credit points | 2 Credits (4 ECTS) |
| Required and recommended prerequisites for joining the module | General Chemistry 1 |
| Module objectives/intended learning outcomes | 1. Describe the chemical processes of experiments 2. Use the equipment in chemistry lab correctly 3. Calculate, write chemistry laboratory report correctly 4. Work in lab safely, scientifically |
| Content | The objective of the general chemistry laboratory course is to become proficient in techniques used by practicing chemist, to use and handle safely and properly laboratory glassware, to carry out experiments safely and carefully in the laboratory, to obtain data accurately and to manipulate the data correctly. This course also complements and consolidates the theoretical knowledge acquired in the general chemistry lecture course. In as much as this course is only a supplement to general chemistry lecture courses, students must have had the general chemistry lecture. |
| Examination forms | Written exam  Midterm test: 20%  Experimental Reports: 60%  Final test: 20% |
| Study and examination requirements | Minimum lab hours: 7/9  If score of the final exam ≤ 3, the final score will be (midterm test) \*20% + (Average of Experimental Reports) \* 30% + (Final exam) \* 20%. |
| Reading list | Textbooks:   1. General Chemistry Laboratory 1, Hoàng Ngọc Cường (2023). 2. General Chemistry Laboratory 1-Prelab-Report, Hoàng Ngọc Cường (2023). |

#### 32. General Chemistry Laboratory 2 – CHE00082

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| --- | --- |
| Module designation | General Chemistry Laboratory 2 |
| Semester(s) in which the module is taught | 3rd semester |
| Person responsible for the module | Lecturers at Faculty of Chemistry, University of Science, VNU-HCM |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Do lecturing, teamwork, divide students into groups to solve problems |
| Workload (incl. contact hours, self-study hours) | 90 Hours  Contact hours: Exercise: 60 hours  Private study: 30 hours (self-study) |
| Credit points | 2 Credits (4 ECTS) |
| Required and recommended prerequisites for joining the module | General Chemistry 2 |
| Module objectives/intended learning outcomes | 1. Describe the chemical processes of experiments 2. Use the equipment in chemistry lab correctly 3. Calculate, write chemistry laboratory report correctly 4. Work in the lab safely, scientifically |
| Content | General Chemistry Laboratory 2 is an introductory course to the general chemistry laboratory. The overall goal of this course is to introduce general chemistry focused on understanding the concepts within the labs and the scientific method. These concepts include but are not limited to: understanding basic operation in a chemistry laboratory, components of matter, stoichiometry, determination of concentration by titration, weight measuring, preparation and properties of inorganic and organic substances. |
| Examination forms | Written exam Midterm test: 20% + Experimental Reports: 60% + Final test: 20% |
| Study and examination requirements | Minimum lab hours: 7/9  If score of the final exam ≤ 3, the final score will be (midterm test) \*20% + (Average of Experimental Reports) \*30% + (Final exam) \*20%. |
| Reading list | Textbooks:  Hoang Ngoc Cuong, General Chemistry Laboratory 2 Manual |

#### 33. General Biology I - BIO00001

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| --- | --- |
| Module designation | General Biology I |
| Semester(s) in which the module is taught | 3rd semester |
| Person responsible for the module | Lecturers at Faculty of Biology and Biotechnology, University of Science, VNU-HCM |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | This course introduces the topic, gives questions, asks students to see the clip, discusses and reviews |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 135  Contact hours (please specify whether lecture, exercise, laboratory session, etc.):  - Lecture hours: 45  - Practical hours: 0  - Exercise hours: 0  - Extra-contact hours per week: 0  Private study including examination preparation, specified in hours: 90 hours |
| Credit points | 3 Credits (4.5 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | 1. Know the fundamental concepts of biology and the scientific process; distinguish observation, hypothesis, test, and theory 2. Explain the chemical composition of living matter, and chemical reaction related to biology 3. Describe the structure and properties of water, structure and function of large biology molecules 4. Distinguish the structure and function of cells, membranes and cellular organelles 5. Describe metabolism at the cellular level, including enzyme activity, cellular respiration, and photosynthesis. 6. Describe DNA structure and function, including replication and repair, transcription, and translation. 7. Describe the mechanism of genetic: cell division, fertilization, mutation, and genetic variation. 8. Explain Biotechnology 9. Explain the evolution and biodiversity 10. Describe the concepts and mechanisms of the origin of species |
| Content | Introduction to Biology:  The fundamental concepts in biology  The scientific methods to study life  Part 1. The chemical of life  Part 2. The Cell  Part 3. Genetics  Part 4. Mechanisms of Evolution  Conclusion |
| Examination forms | Multiple choice test |
| Study and examination requirements | Students create groups: listen, write, and give questions and answers.  6 Quizzes - Midterm examination - Final examination |
| Reading list | Textbooks   1. Bui Trang Viet (2012). Cell Biology. VNU-HCM. 2. Pham Thanh Ho (2011). Biology: Cell, genetics and evolution. VNU-HCM.   Supplementary reading   1. Reece J. B., Urry, L. A., Cain M. L. 1., Wasserman S. A., Minorsky P. V., Jackson R.B., & Campbell N. A. (2014). Campbell biology (1st edition), Pearson. 2. Lecture slides and related clips. |

#### 34. General Biology II - BIO00002

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| --- | --- |
| Module designation | General Biology II |
| Semester(s) in which the module is taught | 3rd semester |
| Person responsible for the module | Lecturers at Faculty of Biology and Biotechnology, University of Science, VNU-HCM |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Lecturing, posing questions for discussions, presenting videos, giving homework |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 135  Contact hours (please specify whether lecture, exercise, laboratory session, etc.):  - Lecture hours: 45  - Practical hours: 0  - Exercise hours: 0  - Extra-contact hours per week: 0  Private study including examination preparation, specified in hours: 90 hours |
| Credit points | 3 Credits (4.5 ECTS) |
| Required and recommended prerequisites for joining the module | Required prerequisites:  Recommended prerequisites: General Biology I |
| Module objectives/intended learning outcomes | PART 1. PLANT MORPHOLOGY AND FUNCTION  Learners get to know about plant morphology, functions, and their ecological relationships. They explore nutrient absorption, material transport in vascular plants, and the vital role of soils in providing nutrients. Additionally, they examine plant life cycles, reproductive systems, and how plants respond to environmental cues for survival.  PART 2. ANIMAL MORPHOLOGY AND FUNCTION  Learners explore the correlation between animal anatomy and physiology. They delve into the structure and functions of key systems including digestion, circulation, respiration, immunity, endocrinology, reproduction, and the nervous system. Additionally, they study osmoregulation, excretion processes, and the mechanisms underlying animal sensation and movement.  PART 3. ECOLOGY  Learners explore ecological factors and their impacts on organisms, studying adaptation strategies. They learn about ecosystem components, structural dynamics, functional processes, material and energy cycling, and equilibrium within ecosystems. Concepts of population dynamics, community interactions, and biosphere principles are also covered, along with the significance of biodiversity conservation for sustaining ecosystems locally in Vietnam and globally. |
| Content | Part 1. Plant Morphology and Function  Part 2. Animal Form and Function  Part 3. Ecology |
| Examination forms | Multiple choice test |
| Study and examination requirements | None |
| Reading list | Textbooks in English   1. Begon M., J.L. Harper, and C.R. Townsend (1986). Ecology: Individuals, Populations and Communities, Blackwell Scientific Publications. 2. Brooker, R.J, Widmaier E.P; Graham L.E and Stiling P.D. (214). Biology, McGraw-Hill. 3. Campbell N.A, J.B. Reece, L.A. Urry, M.I. Cain, S.A. Wasserman, P.V. Minorsky, and R. B. Jackson (214). Biology (1st Edition), Pearson, Benjamin Cummings. 4. Stiling P. D. (22). Ecology: Theories and Applications (Fourth Edition), Prentice-Hall, Inc. 5. Smith A.M; Coupland G; Dolan L; Harberd N; Jones J; Martin C; Sablowski R; and Amey A. (21). Plant biology, Garland Science.   Textbooks in Vietnamese   1. Nguyễn Đình Giậu (1997). Sinh học Đại cương, Tủ sách ĐH. KHTN. 2. Dương Hữu Thời (1998). Cơ sở Sinh Thái Học, Nhà xuất bản Đại học Quốc Gia Hà Nội. 3. Hoàng Kim Ngũ, Phùng Ngọc Lan (1998). Sinh Thái Rừng, Nhà xuất bản Nông Nghiệp. 4. Lê Văn Khoa, Nguyễn Văn Cự, Lê Đức, Lưu Đức Hải, Thân Đức Hiền, Trần Khắc Hiệp, Nguyễn Đình Hòe, Phạm Ngọc Hồ, Trịnh Thị Thanh (21). Khoa Học Môi Trường, Nhà xuất bản Giáo dục Việt Nam. 5. Trần Kiên, Hoàng Đức Nhuận, Mai Sỹ Tuấn (22). Sinh Thái Học và Môi trường, Nhà xuất bản Giáo Dục.   Other sources:  We bsite E-learning KhanViet - ĐH Khoa học Tự Nhiên Thành phố Hồ Chí Minh. |

#### 35. Labwork on General Biology I - BIO00081

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| Module designation | Labwork on General Biology I |
| Semester(s) in which the module is taught | 3rd semester |
| Person responsible for the module | Dr. Luong Thi My Ngan (Faculty of Biology and Biotechnology, University of Science, VNU-HCM) |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Lecture   1. Introduction to laboratory rules 2. Divide students into groups of three or two 3. Guide experimental procedure   Monitor and examine students doing experiments |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 30  Contact hours (please specify whether lecture, exercise, laboratory session, etc.):  - Lecture hours: 0  - Practical hours: 30  - Exercise hours: 0  - Extra-contact hours per week:  Private study including examination preparation, specified in hours: |
| Credit points | 1 Credits (2 ECTS) |
| Required and recommended prerequisites for joining the module | Required prerequisites: General Biology 1 |
| Module objectives/intended learning outcomes | 1. Prepare temporary slides to observe cell structures and living activities. 2. Use a microscope proficiently. 3. Identify organic compounds (carbohydrates, proteins, lipids, enzymes like amylase). 4. Demonstrate and measure plant respiration. 5. Classify plants (lichens, algae, bryophytes, pteridophytes, gymnosperms, monocots, dicots). 6. Classify animals into major orders. 7. Use basic lab tools (test tubes, beakers, pipettes, etc.) effectively. 8. Collaborate and assist team members to complete tasks on time. 9. Follow lab safety rules and ensure personal and team safety. |
| Content | Introduction of Syllabus  How to use a light microscope  Cell structure; Osmosis; Chemical Composition of Cells; Enzyme Activity; Respiration; Mitosis; Microbial Diversity. Plant Diversity; Animal Diversity |
| Examination forms | Lab Activity and Lab Report  Lab exam |
| Study and examination requirements | Study Requirements:   1. Listen 2. Do experiments 3. Making lab report 4. Put tools back in right places 5. Clean up.   Examination Requirements: Experimental process & Final exam |
| Reading list | Compulsory:   1. Lab manual: Bui Trang Viet & Le Thi My Phuoc (Editors) (2016), Lab work on General Biology I (Internal circulation) 2. Class lecture (ppt file) for Lab work on General Biology I   Supplementary:  Dickey Jean (2003) Laboratory investigations for biology |

#### 36. Labwork on General Biology II - BIO00082

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| Module designation | Labwork on General Biology II |
| Semester(s) in which the module is taught | 3rd semester |
| Person responsible for the module | MSc. Phan Ngo Hoang (Faculty of Biology and Biotechnology, University of Science, VNU-HCM) |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | preaching, guiding, discussion |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 30  Contact hours (please specify whether lecture, exercise, laboratory session, etc.):  - Lecture hours: 0  - Practical hours: 30  - Exercise hours: 0  - Extra-contact hours per week:  Private study including examination preparation, specified in hours: |
| Credit points | 1 Credits (2 ECTS) |
| Required and recommended prerequisites for joining the module | Required prerequisites: General Biology 2 |
| Module objectives/intended learning outcomes | 1. Distinguish different plant tissues and organs. 2. Understand and classify plant pigments. 3. Demonstrate environmental impacts on photosynthesis. 4. Explore respiration and fermentation in plants. 5. Identify different animal tissues and prove bioelectricity. 6. Explain hormonal effects on blood flow. 7. Understand climatic impacts on ecosystems. 8. Describe biological reactions and processes. 9. Interpret respiration and photosynthesis. 10. Explain cellular signal transduction. 11. Distinguish plant and animal structures and evolution. 12. Conduct and analyze biological experiments and biodiversity research. |
| Content | 1. Practice theory 2. Tissue and plant organs 3. Plant pigments 4. Photosynthesis 5. Respiration and fermentation in plants 6. Water transport of tissues 7. Animal tissues 8. Mechanical and bioelectric activities 9. Circulation of blood in the vein 10. Climate factor |
| Examination forms | Abstract paper: objectives, principles and methods of practice  Practice report  Practice and question |
| Study and examination requirements | 1. Listen, take note, practising, discussing 2. Students must not be absent in practice theory class (the first week) 3. Students wear blouses when entering the Lab 4. Submit practice reports at the end of the practice session 5. Students who are absent for more than 2 practice sessions will be banned from the final exam. 6. Examination Requirements:    1. Homework    2. Lab work    3. Final examination |
| Reading list | Textbooks:  Bùi Trang Việt và Phan Ngô Hoang 2009. Giáo trình thực tập Sinh học đại cương II. Trường ĐH KHTN - ĐHQG-HCM  Supplementary reading:   1. Lecture notes 2. Phạm Thành Hổ 1998. Sinh học đại cương. Nhà xuất bản giáo dục. |

#### 37. General Physics 1 (Mechanics and Thermodynamics) – PHY00001

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| Module designation | General Physics 1 (Mechanics and Thermodynamics) |
| Semester(s) in which the module is taught | 3rd semester |
| Person responsible for the module | Prof. Chau Van Tao (Faculty of Physics and Engineering Physics, University of Science, VNU-HCM) |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Lecture, discussion. |
| Workload | 135 Hours  Contact hours: Lectures: 45 hours (in class)  Private study: 90 hours (self-study) |
| Credit points | 3 Credits (4.5 ETCS) |
| Required and recommended  prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | This course covers the principles of kinematics, dynamics, statics, work, energy, linear momentum, gravitation, and thermodynamics. Students who complete this module could achieve the following:   1. Knowledge: Be able to understand and apply laws of mechanics to explain physical phenomena and solve problems; Be able to understand and apply mechanisms of heat transfer, equations of state, the first and the second law of thermodynamics. 2. Skills: Be able to work at an individual level and group work. 3. Competence: Ability to apply mechanics and thermodynamics knowledge to analyze physical situations. 4. Attitude: Honest |
| Content | This module includes the following topics:   1. Physics and measurement 2. Kinematics of particles 3. Force and Newton's laws 4. Conservation laws in classical mechanics 5. Kinetics of rigid bodies 6. The ideal gas 7. The first law of thermodynamics 8. The second law of thermodynamics |
| Examination forms | * Class discussion. * Quizzes and projects. * Mid-term and Final exam: Written exam (closed book). |
| Study and examination requirements | Minimum attendance at lectures is 80% (Absences must not exceed 3 times for the entire duration of the lectures)  Final score is greater or equal to 5.0/10.0 |
| Reading list | Main books:  Nguyen Nhat Khanh (2005). Mechanics and thermodynamics lectures. VNUHCM Publishing House, Vietnam.  References:   1. Nguyen Thanh Van. (2013) General Physics 1. VNUHCM Publishing House, Vietnam. 2. Raymond A. Serway, John W. Jewett, Sr, (2014). Physics for Scientists and Engineers with Modern Physics. Brooks/Cole Publishing Company, USA. 3. Alan Giambattista, Betty McCarthy Richardson, Robert C. Richardson, (2010). Physics. McGrawHill Companies, Inc, USA. |

#### 38. General physics 2 (Electromagnetism - Optics) – PHY00002

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| Module designation | General Physics 2 (Electromagnetism - Optics) |
| Semester(s) in which the module is taught | 3rd semester |
| Person responsible for the module | Assoc. Prof. Huynh Truc Phuong (Faculty of Physics and Engineering Physics, University of Science, VNU-HCM) |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Lecture, lesson, discussion |
| Workload | 135 Hours  Contact hours: Lectures: 45 hours (in class) Private study: 90 hours (self-study) |
| Credit points | 3 Credits (4.5 ETCS) |
| Required and recommended prerequisites for joining the module | Calculus 1A, General Physics 1 |
| Module objectives/intended  learning outcomes | This module provides basic knowledge of electric and magnetic fields and thereby an understanding of the laws and phenomena of light optics. Students who complete this module could achieve the following:   1. Knowledge: Be able to understand and apply knowledge of electromagnetism and optics in science and life. 2. Skills: Be able to work at individual level and teamwork. 3. Competence: Ability to apply electromagnetism and optics knowledge to analyze physical situations. 4. Attitude: Honesty and diligence |
| Content | This module includes the following topics:   1. Electric charge and electric field 2. Conductors in an electric field 3. Electric current and magnetic field 4. Electromagnetic induction and applications 5. The background of light optics 6. Interference of light 7. Diffraction of light 8. Polarization of light |
| Examination forms | Oral presentation  Mid-term and Final exam: written exam (closed book) |
| Study and examination requirements | Minimum attendance at lectures is 80% (Absences must not exceed 3 times for the entire duration of the lectures)  Final score is greater or equal to 5.0/10.0 |
| Reading list | Main books:  Nguyen Thanh Van. (2015) General Physics. VNUHCM Publishing House, Vietnam.  References:   1. Le Vu Tuan Hung (2015) Optics. VNUHCM 2. Publishing House, Vietnam. 3. Raymond A. Serway, John W. Jewett, Sr (2014). Physics for Scientists and Engineers with Modern Physics. Ninth Edition. BROOK/COLE, USA. 4. Alan Giambattista, Betty McCarthy Richardson, Robert C. Richardson (2010). Physics. Second Edition. McGrawHill, USA. |

#### 39. Labwork on General Physics – PHY00081

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| --- | --- |
| Module designation | Labwork on General Physics |
| Semester(s) in which the module is taught | 3rd semester |
| Person responsible for the module | MSc. Huynh Thanh Nhan (Faculty of Physics and Engineering Physics, University of Science, VNU-HCM) |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Lab work, discussion, practice |
| Workload (incl. contact hours, self-study hours) | 120 Hours  Contact hours: Lab work: 60 hours (in class) Private study: 60 hours (self-study) |
| Credit points | 2 Credits (4 ETCS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | This course is a practical subject in the laboratory. This course helps students understand how to measure some physical quantities, experimental errors, analyze and evaluate measurement results. Students who complete this module could achieve the following:   1. Knowledge: Be able to describe the process, how to measure fundamental physical quantities in the laboratory. Be able to use instruments and equipment to measure experimental data of physical quantities correctly. Be able to determine (calculate) physical quantities from measured experimental data. Be able to determine the error of experimental measurement of physical quantities. 2. Skills: Be able to work in individual, group work, self-study, and problem solving. 3. Competence: Be able to analyze, process and write experimental data reports. 4. Attitude: be honest, responsible, respect for colleagues. |
| Content | In this module, Students practice 10 of the following 13 experiments:   * + - 1. Practice 1: Density of liquid and solids. The private mass of the metals.       2. Practice 2: Viscosity. Viscosity is dependence of different temperatures.       3. Practice 3: Reversible pendulum. The Mathematical pendulum.       4. Practice 4: Heat of function for ice. Determination of heat.       5. Practice 5: Mechanical equivalent of heat. The heat capacity of metals.       6. Practice 6: Wheatstone Bridge. Resistor is dependent of different temperatures.       7. Practice 7: Voltmeter and Ammeter DC. Voltmeter and Ammeter AC.       8. Practice 8: AC circuit. RLC circuit.       9. Practice 9: Diode characteristics.       10. Practice 10: Transistor characteristics.       11. Practice 11: Microscope. To measure the diameter of other small objects.       12. Practice 12: Refraction by a prism. Dispersion and resolving the power of prisms.       13. Practice 13: Polarization of light Rotatory power. |
| Examination forms | Practice reports, practice exam |
| Study and examination requirements | Minimum attendance at Lab is 80% (Absences must not exceed 3 times for the entire duration of the lectures)  Final score is greater or equal to 5.0/10.0 |
| Reading list | Dang Van Liet, Do Dinh Luyen, Nguyen Van Nghia, Tran Thi Kim Phuong, “General Physics Experiments”, University of Science, VNU-HCM, 2008. |

#### 40. Introduction to Informatics – CSC00003

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| Module designation | Introduction to Informatics |
| Semester(s) in which the module is taught | 1st semester |
| Person responsible for the module | Lecturers at Centre of Informatics, University of Science, VNU-HCM |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lecture, problem, lab works |
| Workload (incl. contact hours, selfstudy hours) | Total workload: 165 hrs  Contact hours: Lectures: 15 hours (in class) and lab works 6 it 0 hours  Private study: 90 hours (self-study) |
| Credit points | 3 Credits (5.5 ETCS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | After completing the course, students will be able to:   1. Explain common concepts and terms related to the field of computer science. 2. Perform basic operations related to the Windows operating system and common software. 3. Create documents with professional format, structure, and presentation using software. 4. Analyze and organize data in spreadsheet format, use calculation, search, and statistical functions to create formulas for data processing and presentation. 5. Create eye-catching presentations. 6. Express concepts related to the Internet, information security on the network. 7. Be aware of searching for information and legal regulations regarding copying, sharing, and posting information on the Internet. 8. Design a basic electronic information page. |
| Content | 1. Basic understanding of IT    1. Basic knowledge of computers and computer networks.    2. Access control, ensuring data security, Malware.    3. Basic legal issues in using IT. 2. Basic computer usage    1. Windows operating system    2. Windows Explorer    3. Control Panel    4. Data compression and extraction    5. Typing in Vietnamese 3. Basic Microsoft Word    1. Document composition    2. Text formatting    3. Creating tables    4. Handling graphics in documents    5. Page layout and printing 4. Basic Microsoft PowerPoint    1. Basic presentation templates    2. Creating a presentation    3. Setting up effects for the presentation 5. Basic Microsoft Excel    1. Data formatting in Excel    2. References in Excel    3. Basic Excel functions    4. Printing and creating charts 6. Internet usage    1. Basic knowledge of the Internet    2. Information searching    3. Information security 7. Web image processing    1. Resizing image frames    2. Image cropping    3. Image rotation and flipping    4. Adjusting the brightness of an image    5. Adjusting the contrast of an image 8. Designing a basic electronic information page using HTML & CSS3. |
| Examination forms | Multiple choice exam, practical exam |
| Study and examination requirements | Minimum attendance at lectures is 80% Final score is greater or equal to 5.0/10.0 |
| Reading list | 1. Curriculum for Basic IT Applications, Advanced IT Applications. 2. Microsoft Office MOS materials, IIG Vietnam, Fahasha. 3. IC3 Spark materials, IIG Vietnam, Fahasha. |

# **2. Professional Education Knowledge**

## 2.1. Basic knowledge

#### 1. Measure Theory and Probability - MTH10401

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| Module designation | Measure Theory and Probability |
| Semester(s) in which the module is taught | 3rd semester |
| Person responsible for the module | Prof. Dang Duc Trong |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lectures, group work, small group solving exercises |
| Workload (incl. contact hours, self-study hours) | 165 hours  Contact hours: lectures 45 hours + 30 exercise hours *(in class)*  Private study: 90 hours *(self-study)* |
| Credit points | 4 Credits (6.5 ECTS) |
| Required and recommended prerequisites for joining the module | Analysis A1 |
| Module objectives/intended learning outcomes | The objective of the module is to equip students with the basic knowledge of the foundation of measure theory and the theory of integral, and the application of the measure theory in probability theory. |
| Content | 1. Elementary probability theory, abstract measure theory. 2. Integration with respect to probability measures, expectation, and variance 3. Random variables, Law of large numbers and limit theorems. 4. Changes of measures and the Radon-Nikodym Theorem. 5. Conditional expectations, filtrations, and martingales. |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Exercises 20%; Mid-term 30%; Final exam 50%.  Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | 1. Đặng Đức Trọng, Đinh Ngọc Thanh, Giáo trình lý thuyết độ đo và xác suất, NXB ĐHQG Tp HCM, 2014.  2. K. L. Chung, A course in probability theory, 3rd edition, Academic Press, 2001.  3. D. M. Đức, Lý thuyết độ đo và tích phân, NXB Đại Học Quốc Gia Tp. HCM, 2006.  4. P.H. Quân, Đ.N. Thanh, Xác suất thống kê, NXBGD, 2011 |

#### 2. Algebra A2 - MTH10402

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| Module designation | Algebra A2 |
| Semester(s) in which the module is taught | 3rd semester |
| Person responsible for the module | Dr. Tran Ngoc Hoi |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lectures, group work, small group solving exercises |
| Workload (incl. contact hours, self-study hours) | 165 hours  Contact hours: lectures 45 hours + 30 practical hours *(in class)*  Private study: 90 hours *(self-study)* |
| Credit points | 4 Credits (6.5 ECTS) |
| Required and recommended prerequisites for joining the module | Prerequisite courses: Linear Algebra (MTH00030) |
| Module objectives/intended learning outcomes | General objective: To equip students with basic knowledge of advanced linear algebra, as a foundation for specialized courses in Mathematics.  Specific objectives for course learning outcomes:   1. Knowledge: Master the diagonalization and Jordanization of linear operators on finite-dimensional vector spaces, the structure of Euclidean spaces, bilinear forms, and quadratic forms. 2. Skills: Diagonalization and Jordanization of matrices on numeric fields, computation in Euclidean space, quadratic transformations. 3. Attitude, diligence: Serious, progressive. |
| Content | This course introduces the basic knowledge of linear operator reduction (diagonalization, Jordan canonical form), Euclidean space, bilinear form, and quadratic form. |
| Examination forms | Midterm and Final exam: written exam |
| Study and examination requirements | Tests – process score: 50%  Final exam: 50%  Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | 1. Đại số tuyến tính và Ứng dụng, Tập 2, Bùi Xuân Hải, Trần Ngọc Hội, Lê Văn Luyện, 2017. 2. Giáo trình Đại số tuyến tính, Ngô Việt Trung, 2000. 3. Đại số tuyến tính, Nguyễn Hữu Việt Hưng, 2004. |

#### 3. Functional Analysis - MTH10403

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| Module designation | Functional Analysis |
| Semester(s) in which the module is taught | 6th semester |
| Person responsible for the module | Assoc. Prof. Bui Le Trong Thanh |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | lectures, practice sessions |
| Workload (incl. contact hours, self-study hours) | 165 hours  Contact hours: lectures 45 hours + 30 exercise hours *(in class)*  Private study: 90 hours *(self-study)* |
| Credit points | 4 Credits (6.5 ECTS) |
| Required and recommended prerequisites for joining the module | Analysis 1A (MTH00010), Analysis 2A (MTH00012), Analysis 3A (MTH00014) |
| Module objectives/intended learning outcomes | * General Objective: Functional analysis is where students get their first basic understanding of infinite-dimensional spaces. This knowledge is indispensable for many specializations in both theoretical and applied mathematics. This is one of the first courses where the ability to acquire and use abstract and precise mathematical reasoning is trained and tested. * Specific objectives/course outcomes standards:   1. Knowledge: understand and apply in specific situations some basic concepts and results about Euclidean spaces, l^p, L^p spaces, bounded functions spaces, space of continuous linear mappings, Hilbert space.   2. Skills: systematically understanding the above objects, grasping the relationships between concepts and results. Distinguish and criticize arguments that do not meet the exact requirements of mathematics.   3. Attitude, diligence: Seeing the need for generalized development, thereby helping to solve application problems, thereby having a serious, proactive, and self-disciplined learning attitude. |
| Content | Metric space, normed space, continuous linear mapping between two normed spaces and their fundamental theorems, Hilbert space. This subject is considered as the basic knowledge for university level Mathematics. An essential and useful course for mathematical models using function spaces and infinite dimensional spaces (in Algebra, Optimization, Probability-Statistics, Partial Differential Equations, Analysis, Mathematical Methods in Physics, Computer Science, ...). |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Assignments: 50%; Final Exam: 50%  Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | 1. Bài giảng Giải tích hàm, Đinh Ngọc Thanh, Huỳnh Quang Vũ. 2. Giải tích hàm, Dương Minh Đức, 2005 3. Giải tích hàm, Đinh Ngọc Thanh, Đặng Đức Trọng, 2011 |

#### 4. Mathematical Statistics - MTH10404

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| Module designation | Mathematical Statistics |
| Semester(s) in which the module is taught | 4th semester |
| Person responsible for the module | Dr. Hoang Van Ha |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | lectures, exercises, practice sessions |
| Workload (incl. contact hours, self-study hours) | Total: 145 hours.  Contact hours: lectures 15 hours; 30 exercise hours + 30 practical lessons in the laboratory.  Private study: 70 hours (self-study) |
| Credit points | 3 Credits (5.5 ECTS) |
| Required and recommended prerequisites for joining the module | Measure Theory and Probability (MTH10401), Analysis A1 (MTH00010) |
| Module objectives/intended learning outcomes | This course provides foundations of statistical inference. Students will be able to make inferences from data, make decisions and predictions. Students can apply statistical techniques to practical problems using R or SPSS. |
| Content | 1. Descriptive statistics. Sampling distributions. 2. Point estimations: definition, estimators, and estimates. Unbiasedness, efficiency, consistency. Method of moments, method of maximum likelihood, Bayes estimators. Minimum variance unbiased estimator, Cramer-Rao lower bound. 3. Confidence interval: CI for means, variances and proportions. 4. Hypothesis testing: basic concepts, null and alternative hypotheses, simple and compound hypotheses, type I and II errors, critical region, size and power of a test, p-value. Neyman - Pearson lemma. Likelihood Ratio tests. z-tests and t-tests. Goodness of fit test. 5. Linear Regression. |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Homework exercises: 10%  Computing exercises: 20%  Mid-term: 20%; Final exam: 50%  Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | * 1. Casella, George, and Roger L. Berger. *Statistical inference*. Cengage Learning, 2021.   2. Lehmann, Erich Leo, Joseph P. Romano, and George Casella. *Testing statistical hypotheses*. Vol. 3. New York: Springer, 2005.   3. Montgomery, Douglas C., and George C. Runger. *Applied statistics and probability for engineers*. John Wiley & Sons, 2010. |

## 2.2. Required Courses for Specialization

### 2.2.1. Specialization in Mechanics

#### 1. Numerical Analysis 1 - MTH10410

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| Module designation | Numerical Analysis 1 |
| Semester(s) in which the module is taught | 4th semester |
| Person responsible for the module | Dr. Ong Thanh Hai |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lectures, lab works |
| Workload (incl. contact hours, self-study hours) | 165 hours  Contact hours: lectures 45 hours + 30 practical lessons in the laboratory.  Private study: 90 hours *(self-study).* |
| Credit points | 4 Credits (6.5 ECTS) |
| Required and recommended prerequisites for joining the module | Calculus 1A (MTH00011), Calculus 2A (MTH00013), Computational Software Laboratory (MTH00087) |
| Module objectives/intended learning outcomes | General Objective: To introduce the basic concepts and approximation methods of numerical analysis, and to provide students with the tools to find approximate solutions to problems involving equations and systems of equations. By finding algorithms to solve the problems posed, this module aims to equip students with knowledge to solve real problems based on theoretical math knowledge and the means of computations.  The course helps students understand the following knowledge: the concept of approximation and types of errors. Understand the most basic approximation methods and their applications. Application of computational software in numerical calculations. |
| Content | The content of the course includes the approximate theories and their application to find the approximate solutions of the single variable equations and the system of linear equations, and the approximate derivative, integral... These methods, which are applied to physical problems, are used in the Matlab program to simulate. |
| Examination forms | Midterm and Final exam: written exams. |
| Study and examination requirements | Exam: 30%, Final Exam: 70%.  Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | 1. Numerical Analysis. Ninth Edition. Brooks, Burden and Faires, 2010. 2. Numerical Analysis. Pearson, Sauer, 2006. 3. Numerical Analysis. Brooks/Cole Publishing Company, Kincaid, W. Cheney, 1991. 4. Numerical methods using Matlab. Third Edition. Prentice Hall, J. H. Mathews, K. D. Frink, 1999 |

#### 2. Equations of Mathematical Physics - MTH10413

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| Module designation | Equations of Mathematical Physics |
| Semester(s) in which the module is taught | 5th semester |
| Person responsible for the module | Dr. Nguyen Thanh Long |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lectures |
| Workload (incl. contact hours, self-study hours) | Total: 150 hours  Contact hours: lectures 60 hours (in-class).  Private study: 90 hours (self-study). |
| Credit points | 4 Credits (6.0 ECTS) |
| Required and recommended prerequisites for joining the module | Calculus 1A (MTH00011), Calculus 2A (MTH00013), Analysis 1A (MTH00010) |
| Module objectives/intended learning outcomes | Introduce the basic mathematical physics equations and know how to find classical solutions by Fourier’s method of separation of variables. |
| Content | Linear ordinary differential equations of the second order. Wave equations; Heat equations; Laplace equations. |
| Examination forms | Midterm and Final exam: written exams. |
| Study and examination requirements | Midterm Exam: 30%, Final Exam: 70%  Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | 1. Bài giảng phương trình toán lý, Nguyễn Thành Long, 2020. 2. Phương Trình Vật lý - Toán nâng cao, Nguyễn Công Tâm, 2002. 3. Partial Differential Equations, An introduction, David Colton, 1988. 4. Partial Differential Equations, L.C. Evans, 1998. 5. Fundamentals of differential equations and boundary value problems, R. Kent Nagle, Edward B. Saff, 1993. |

#### 3. Theoretical Mechanics - MTH10427

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| Module designation | Theoretical mechanics |
| Semester(s) in which the module is taught | 5th semester |
| Person responsible for the module | Dr. Trinh Anh Ngoc |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lectures |
| Workload (incl. contact hours, self-study hours) | Total: 150 hours  Contact hours: lectures 60 hours (in-class).  Private study: 90 hours (self-study). |
| Credit points | 4 credits (6.0 ECTS) |
| Required and recommended prerequisites for joining the module | Knowing calculus and linear algebra. |
| Module objectives/intended learning outcomes | General Objective: To provide basic knowledge of Newtonian mechanics. Help students know how to set and solve basic mechanical problems. Know how to analyze and explain mechanical phenomena based on Newton's laws. The course introduces mathematical modeling of real-world processes.  Specific objectives/course learning outcomes:   1. Knowledge: Newton's laws and their consequences. 2. Know how to build mathematical models describing mechanical phenomena. Know how to solve some mechanical problems. 3. Attitude, diligence: Positive and dynamic. |
| Content | This module includes the following topics:   1. Vectors 2. Mechanics of Particles 3. Mechanics of Particle Systems 4. Mechanics of Connected Systems |
| Examination forms | Midterm and Final exam: written exams. |
| Study and examination requirements | Tests – process score: 40%; Final exam: 60 %  Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | 1. Bài giảng Cơ học lý thuyết, Trịnh Anh Ngọc, 2018. 2. Nhập môn cơ học, Đặng Đình Áng, Trịnh Anh Ngọc, Ngô Thành Phong, 2003. 3. Classical Mechanics, Douglas Gregory, 2006. 4. Classical Mechanics Solutions manual, Douglas Gregory, 2006. |

#### 4. Continuum Mechanics - MTH10428

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| Module designation | Continuum mechanics |
| Semester(s) in which the module is taught | 7th semester |
| Person responsible for the module | Dr. Bui Xuan Thang |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lecture |
| Workload (incl. contact hours, self-study hours) | Total workload: 180 hours.  Contact hours: 60 hours.  Self-study hours: 120 hours. |
| Credit points | 4 Credits (6.0 ETCS) |
| Required and recommended prerequisites for joining the module | Knowing Calculus and Linear Algebra. |
| Module objectives/intended learning outcomes | General Objective: To provide students with fundamental knowledge of continuums in mechanics and mathematical modeling for continuums. Introduce students to in-depth research directions on continuous environmental objects: Deformed solids, Fluids.  Specific objectives/course output standards:   1. Knowledge: Understand the concept of continuum, the laws of physics. Apply concepts and laws to mathematically model continuum. 2. Skills: Apply concepts and laws to mathematically model continuums such as elastic solid bodies, fluids. 3. Attitude, diligence: After the course, students will understand and be interested in the direction of mathematical research in continuum mechanics. |
| Content | This course introduces and provides the foundation knowledge for the modules of Deformed Solid Mechanics, Fluid Mechanics, Fracture Mechanics, Composite Materials, and Mechanics Seminar.   1. Analysis of stress 2. Deformation and strain 3. Motion and flow 4. Fundamental laws of continuum mechanics 5. Linear elasticity 6. Fluids |
| Examination forms | Midterm and Final exam: written exams. |
| Study and examination requirements | Tests – process score: 35%; Final exam: 65 %  Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | 1. Continuum Mechanics, George E. Mase, 1970 2. Cơ học môi trường liên tục, Đào Huy Bích, 2002 |

#### 5. Finite Element Method - MTH10429

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| Module designation | Finite Element Method |
| Semester(s) in which the module is taught | 5th semester |
| Person responsible for the module | Dr. Vu Do Huy Cuong |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lectures, group work |
| Workload (incl. contact hours, self-study hours) | Total: 165 hours  Contact hours: Lectures 45 hours + 30 lab works hours (in class)  Private study: 90 hours (self-study) |
| Credit points | 4 Credits (6.5 ETCS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | General Objective: To provide basic knowledge of the finite element method. Help students know how to apply the finite element method to solve boundary problems, boundary-value problems appearing in mechanics and physics.  Specific objectives/course learning outcomes:   1. Knowledge: Master the concepts and procedures in the finite element method. 2. Skills: Know how to apply finite element method to numerically solve boundary problems, boundary-first value problems (from finite element discretization to Matlab programming). 3. Attitude, diligence: Positive and dynamic. |
| Content | This module includes the following topics:   1. Introduction to numerical methods and finite element methods. 2. Application of the finite element method to scientific and engineering problems. 3. Fundamental theory of the finite element method. 4. Finite element for partial differential equations. 5. Finite element for elasticity theory. |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Minimum attendance at lectures is 80% (Absences must not exceed 3 times for the entire duration of the lectures).  Final score is greater or equal to 5.0/10.0. |
| Reading list | Main textbook:  Bài giảng Phương pháp phần tử hữu hạn, Trịnh Anh Ngọc, lecture note, 2018.  References:   1. Finite element Analysis, Flaherty J.E., lecture note, 2000. 2. The finite element method in engineering, Rao S.S., Elsevier Inc, 1989. |

#### 6. Complex variable functions - MTH10412

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| Module designation | Complex Variable Functions |
| Semester(s) in which the module is taught | 6th semester |
| Person responsible for the module | Assoc. Prof. Ly Kim Ha |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lectures |
| Workload (incl. contact hours, self-study hours) | Total: 150 hours  Contact hours: lectures 60 hours (in-class).  Private study: 90 hours (self-study). |
| Credit points | 4 credits (6.0 ETCS) |
| Required and recommended prerequisites for joining the module | Analysis 1A (MTH00010), Analysis 2A (MTH00012), Analysis 3A (MTH00014), Analysis 4A (MTH00015) |
| Module objectives/intended learning outcomes | Equip with basic knowledge of complex numbers, elementary complex functions, and necessary complex analysis knowledge to be able to apply in the specializations of numerical analysis, partial differential equations, digital signal processing, statistics, and probability. |
| Content | Basis properties of complex numbers and complex functions. Analytic functions, power expansion, line integral and the theory of residues. |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Midterm Exam: 30%, Final Exam: 70%. |
| Reading list | 1. Complex analysis, Theodore Gamelin, 2001. 2. Complex variables with applications, David Wunsch, 2005. 3. Complex analysis, V. Ahlfors, 1966. 4. Théorie élémentaire des fonctions analytiques d’une ou plusieurs variables complexes, Henri Cartan, 1961. |

#### 7. Solids Mechanics - MTH10434

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| Module designation | Solid Mechanics |
| Semester(s) in which the module is taught | 6th semester |
| Person responsible for the module | Dr. Bui Xuan Thang |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lecture |
| Workload (incl. contact hours, self-study hours) | Total workload: 180 hours.  Contact hours: 60 hours (in class).  Self-study hours: 120 hours. |
| Credit points | 4 credits (6 ETCS) |
| Required and recommended prerequisites for joining the module | Continuum Mechanics |
| Module objectives/intended learning outcomes | General Objective: To provide students with basic concepts of the laws of behavior of solid bodies. Present some basic laws and theorems related to many practical problems of Deformed Solid Mechanics. Provide students with methods of modelling, solving problems and numerical simulation by computers.  Knowledge: Students understand the basic concepts of the laws of behavior of solid bodies. Students develop methods of modeling, solving problems and numerical simulation by computers. |
| Content | The subject plays an important role in providing basic knowledge and opening in-depth research directions in the Deformed Solid Mechanics. The basic knowledge that can be mentioned is the stress-strain relationship in elastic, viscoelastic and elastoplastic theories... In-depth research directions that can be mentioned are the analysis of the behavior of the plate, shell, composite materials, fracture mechanics... This subject inherits a lot of knowledge from the subject of Continuum Mechanics and is also a prerequisite for Finite Element Method, Fracture Mechanics, and Stability and Vibration…   * 1. Linear elastic solids   2. Formulation and solution strategies   3. Strain energy and related principles   4. Two-dimensional formulation and problem solution   5. Anisotropic elasticity   6. Thermoelasticity   7. Nonhomogeneous elasticity   8. Numerical finite element method   9. An introduction of plasticity. |
| Examination forms | Report/Essay exam |
| Study and examination requirements | Tests – process score: 35%  Final exam: 65 % |
| Reading list | 1. Lý thuyết đàn hồi, Đào Xuân Bích, 2010. 2. Elasticity, M. H. Sadd, 2009. 3. Cơ học môi trường liên tục, Xêđôp L. I., 1978. 4. Nonlinear analysis and continuum mechanics, Giuseppe Buttazzo, 1998. |

#### 8. Fluid Mechanics - MTH10435

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| Module designation | Fluid mechanics |
| Semester(s) in which the module is taught | 6th semester |
| Person responsible for the module | Dr. Nguyen Thi Yen Ngoc |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lectures |
| Workload (incl. contact hours, self-study hours) | Total: 150 Hours  Contact hours: Lectures: 60 hours *(in class)*  Private study: 90 hours *(self-study)* |
| Credit points | 4 Credits (6 ECTS) |
| Required and recommended prerequisites for joining the module | Theoretical Mechanics (MTH10427) |
| Module objectives/intended learning outcomes | This course provides fundamental knowledge on fluid mechanics.   1. Knowledge: understanding the fundamental concepts and basic laws of fluid mechanics. 2. Skills & competences: cognitive and practical abilities to use this knowledge in analyzing the physical and mathematical meaning of fluid mechanics problems and solving some basic problems in certain cases. |
| Content | This module includes the following topics:   1. Introduction 2. Fluid statics 3. Conservation of mass 4. Inviscid flow 5. Conservation of momentum 6. Viscous flow 7. Conservation of energy |
| Examination forms | Midterm and Final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | Main textbook:  Trịnh Anh Ngọc, *Bài giảng “Cơ học chất lỏng lý thuyết”*, 2018.  References:   1. Munson, Young, Okiishi, and Huebsch, *Fundamentals of Fluid Mechanics*, Wiley, 2009. 2. Fay J.A., *Introduction to fluid mechanics*, MIT Press, 1998. 3. I.G. Currie, *Fundamental Mechanics of Fluids*, CRC Press, 2012. |

### 2.2.2. Specialization in Didactics and Methodology of Mathematics

#### 1. Pedagogical Psychology - MTH10101

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| Module designation | Pedagogical Psychology |
| Semester(s) in which the module is taught | 5th semester |
| Person responsible for the module | MSc. Tran Huong Thao |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lecture |
| Workload (incl. contact hours, self-study hours) | 270 Hours  Contact hours: Lectures: 30 hours (in class); 60 practical hours  Private study: 180 hours (self-study) |
| Credit points | 4 Credits (7 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | This course equips students with basic psychological knowledge about teachers and learners, problem-solving skills, teamwork skills and applies them to teaching.   1. Knowledge: Research the psychological problems of managing the teaching-learning process. Determine the conditions to ensure intellectual development in the teaching-learning process. Describe the formation and cultivation of the teacher's personality as well as the psychological development of the learner. 2. Skills & competences: Developing teamwork skills, presentation skills, report writing, and pedagogical communication skills through various approaches tailored to different age groups of the target audience being taught. |
| Content | This module includes the following topics:   1. General overview. 2. Fundamental issues in educational psychology 3. The personality of teachers. 4. Pedagogical activities according to developmental psychology. |
| Examination forms | Midterm and Final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | Main textbook:   1. Lê Văn Hồng, Lê Ngọc Lan và Nguyễn Văn Thàng, Tâm lý học lứa tuổi và tâm lý học sư phạm, Hà Nội, 1995. 2. Hoàng Anh & Vũ Kim Thanh, Giao tiếp sư phạm, Hà Nội, 1995. 3. Trần Thị Hương, Nguyễn Thị Bích Hạnh, Hồ Văn Liên & Ngô Đình Qua, Giáo dục học đại cương, Đại Học Sư Phạm TP. Hồ Chí Minh, 2009. 4. Trần Thị Hương, Võ Thị Bích Hạnh, Hồ Văn Liên, Vũ Thị Sai, Võ Thị Hồng Trước, Giáo dục học phổ thông, Đại Học Sư Phạm TP. Hồ Chí Minh, 2009. 5. Nguyễn Xuân Thức (chủ biên), Tâm lý học đại cương, Đại Học Sư Phạm TP. Hồ Chí Minh, 1995.   References:   1. Peter Filene, The Joy of Teaching: A Practical Guide for New College Instructors, the University of North Carolina Press, 2005. 2. Ken Bain, What the Best College Teachers Do, Harvard University Press, 2004. 3. Rainer Zwisler, Einführung in die Pädagogische Psychologie, 4. Auflage, Weinheim und München, Psychologische Verlags Union Beltz, 1994. 4. J. Zumbach und H. Mandl (Hrsg.), Paedagogische Psychologie in Theorie und Praxis, Verlag Hogrefe, 2008. 5. Klafi, W., Studien zur Bildungstheorie und Didaktik, Weinheim: Beltz, 1975. 6. Rainer Zwisler, Einführung in die Pädagogische Psychologie, Auflage, Weinheim und München, Psychologische Verlags Union Beltz, 1994. 7. Watzlawik, P., Die 5 Kommunikationsaxiome. In: Kommunikation und Selbstsicherheit, Interaktionsspiel für Schule, Jugendarbeit und Erwachsenenbildung, Muelheim, 1995. |

#### 2. Optimal Teaching and Learning Methods - MTH10102

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| Module designation | Optimal Teaching and Learning Methods |
| Semester(s) in which the module is taught | 6th semester |
| Person responsible for the module | MSc. Phan Nguyen Ai Nhi  MSc. Chau Thi Hieu |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lecture, project-based learning |
| Workload (incl. contact hours, self-study hours) | 180 Hours  Contact hours: Lectures: 30 hours (in class); 30 exercise hours  Private study: 120 hours (self-study) |
| Credit points | 3 Credits (5 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | This course plays a crucial role in nurturing foundational knowledge of the fundamental characteristics of contemporary education. It also introduces positive teaching methods (PPGDTC) from the concept, organization, and advantages and disadvantages of each teaching method. From here, learners can approach, select, and flexibly apply these teaching methods in practical classroom settings, teaching in different environments through project activities, in other courses, during teaching internships, and in subsequent teaching activities.   1. Knowledge: Understanding various teaching methods and current teaching issues. Overview of planning and time management. 2. Skills & competences: Evaluating the application of methods in real teaching situations. Developing skills in teamwork, presentation, report writing, planning, and time management. |
| Content | This module includes the following topics:   1. Project-based learning 2. Community Service Learning 3. Positive Teaching Methods |
| Examination forms | Midterm and final exam: project and written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | Main textbook:   1. Robert J. Marzano, Debra J. Pickering, Jane E. Pollock, Các phương pháp dạy học hiệu quả, NXB Giáo dục, 2013 2. Northern Ireland Curriculum Active Teaching and Learning Methods for Key Stages 1,2 &3, APMB Publication, 2007 3. Meg. Stephenson, Service Learning in the Curriculum, University of Utah, USA, 2003 4. G. Stewart, Promoting & Managing Effective Collaborative Group Work, Belfast Education and Library Board, 2014.   References:   1. Nhiều tác giả, Những vấn đề giáo dục hiện nay – Quan điểm và giải pháp, NXB. Tri Thức, 2008 2. Đặng Thành Hưng, Tương tác hoạt động Thầy – Trò trên lớp học, NXB. Giáo dục, 2007 3. Nguyễn Hiến Lê, Tự học – Một nhu cầu của thời đại, NXB. Văn hóa – Thông tin, 2007 4. Barbara Gross David, Tool of Teaching, Jossey-Bass, 2009 5. James M. Banner. Jr. & Harold C. Cannon, The Elements of Teaching, Yale University Press 1997 6. Jeffrey S. Lantis, Lynn M. Kuzma, John Boehrer, The New International Studies Classroom - Active Teaching, Active Learning, Lynne Rienner Publishers, United State, 2000 7. Robert S. Feldman, Power Learning, McGraw Hill, USA 2003 8. Debra H. Hydorn, Community Service Learning in Mathematics, 2011 |

#### 3. General Education- MTH10104

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| Module designation | General Education |
| Semester(s) in which the module is taught | 4th semester |
| Person responsible for the module | MSc. Phan Nguyen Ai Nhi  MSc. Chau Thi Hieu |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lecture, project-based learning |
| Workload (incl. contact hours, self-study hours) | 180 Hours  Contact hours: Lectures: 30 hours (in class) + 30 exercise hours  Private study: 120 hours (self-study) |
| Credit points | 3 Credits (5 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | This course covers issues in general education, learning outcomes in knowledge, educational objectives regarding attitudes, external orientation attitude groups, internal orientation attitude groups, educational theory, and an overview of educational pathways.   1. Knowledge: Comparing the educational model in Vietnam with models in other parts of the world. Analyzing the relationship between educational theory and practical issues. 2. Skills & competences: Selecting teaching methods, assessment methods to design and deliver detailed lesson plans. |
| Content | This module includes the following topics:   1. Education and the Nature of Education 2. Understanding Human Development 3. Designing Educational Programs 4. Learning Outcomes in Knowledge 5. Educational Objectives in Attitudes 6. Sharing 7. Adaptation 8. Defendse 9. Effort 10. Stability 11. Intelligence 12. Common Issues in Educational Theory 13. Content and Behaviour Rules 14. Evaluation Lesson Design (Basic). |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | Main textbook:  Nguyễn Thị Bích Hồng và Võ Văn Nam, Giáo dục học đại cương, Giáo trình ĐHSP Tp. HCM, 2004.  References:   1. Nguyễn An, Giáo dục học đại cương, Giáo trình ĐHSP Tp. HCM, 1997 2. Hà Thế Ngữ và Đặng Vũ Hoạt, Giáo dục học, tập 1, NXB Giáo Dục, 1988. 3. Đặng Vũ Hoạt (chủ biên), Giáo dục học, tập 2, NXB Giáo Dục, 1995. 4. Phạm Viết Vượng, Giáo dục học, NXB ĐHQG Hà Nội, 2000. 5. Nguyễn Thị Bích Hạnh và Trần Thị Hương, Lý luận dạy học, Giáo Trình ĐHSP TP. HCM, 2004. 6. Peter Filene, The Joy of Teaching, University of North Carolina Press, 2005. 7. Ken Bain, What the best college teachers do, Harvard University Press, 2004. 8. E. F. Crawley, J. Malmqvist, S. Oslund, D. R. Brodeur, Rethinking Engineering Education: The CDIO Approach, Springer Science+Business Media, 2007. |

#### 4. Didactics of Teaching - MTH10105

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| Module designation | Didactics of Teaching |
| Semester(s) in which the module is taught | 6th semester |
| Person responsible for the module | MSc. Be Phuong Thao |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lecture, project-based learning |
| Workload (incl. contact hours, self-study hours) | 180 Hours  Contact hours: Lectures: 30 hours *(in class);* 30 practical hours  Private study: 120 hours *(self-study)* |
| Credit points | 3 Credits (5 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | The theory of teaching presents fundamental concepts in the process of imparting and acquiring knowledge in general, particularly within the school context. Simultaneously, it describes and explains phenomena related to the relationship between teaching and students' learning experiences.   1. Knowledge: teaching principles, principles of knowledge transmission. 2. Skills & competences: Handling various teaching situations. Designing teaching scenarios, being proactive, having problem-solving skills, adaptability, and self-regulation. |
| Content | This module includes the following topics:   1. Fundamental Concepts 2. System of Teaching Principles 3. Principles of Knowledge Transmission |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | Main textbook:  Đặng Đức Trọng, Đỗ Thị Bích Trâm, *Lý Luận Dạy học*, NXB Đại học Quốc gia TP. HCM, 2014.  References:   1. Bessot, A., Comiti, C., Chau, L.T.H., Tien, L.V. *Những yếu tố cơ bản của Didactic Toán,* NXB Đại học Quốc gia TP. HCM, 2007 2. Marzano, R. J., Marzano, J. S. and Pickering, D. J. *Quản lí hiệu quả lớp học*, NXB Giáo dục Việt Nam, 2011 3. Thái Duy Tuyên, *Phương pháp dạy học, truyền thống và đổi mới*, NXB Giáo dục Việt Nam, 2010 4. Nguyễn Hữu Châu, *Những vấn đề cơ bản về chương trình và quá trình dạy học*, NXB Giáo dục Việt Nam, 2005 |

#### 5. Elementary Number Theory and Mathematical Logic - MTH10106

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| Module designation | Elementary Number Theory and Mathematical Logic |
| Semester(s) in which the module is taught | 5th semester |
| Person responsible for the module | Dr. Tran Nam Dung |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lecture |
| Workload (incl. contact hours, self-study hours) | 180 Hours  Contact hours: Lectures: 30 hours *(in class);* 30 practical hours  Private study: 120 hours *(self-study)* |
| Credit points | 3 Credits (5 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | This course provides students with fundamental knowledge in mathematics and mathematical logic, which helps them to understand and solve mathematical problems in the general education curriculum. It also cultivates their skills in rigorous reasoning for mathematical proofs and enhances their ability to articulate issues succinctly, coherently, and with adherence to standards.   1. Knowledge: get familiar with basic concepts elementary number theory and mathematical logic. 2. Skills & competences: cognitive and practical abilities to use these knowledges in solving mathematics problems and teaching mathematics. |
| Content | This module includes the following topics:   1. Fundamental Concepts 2. Congruence and Congruence Equations 3. Mathematical Functions 4. Diophantine Equations 5. Propositions and Predicates 6. Mathematical Induction, Contradiction Method |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | Main textbook:  Nguyễn Hữu Anh, *Toán rời rạc,* NXB GD, 1999.  References:   1. G. Polya, *Toán học và những suy luận có lý*, NXB GD,1999 2. Hoàng Chúng, *Số học – Bà chúa của Toán học*, NXB GD, 1997. 3. K.H. Rosen, *Elementary Number Theory and Its Applications*, Addison – Wesley Publishing Company, 1993. |

#### 6. Methods of Teaching Mathematics 1- MTH10110

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| Module designation | Methods of Teaching Mathematics 1 |
| Semester(s) in which the module is taught | 5th semester |
| Person responsible for the module | MSc. Pham Hoang Hai  MSc. Nguyen Do Truong An |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lecture |
| Workload (incl. contact hours, self-study hours) | 180 Hours  Contact hours: Lectures: 30 hours (in class); 30 practical hours  Private study: 120 hours (self-study) |
| Credit points | 3 Credits (5 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | The course addresses issues related to propositions, sets, functions, equations, algebraic inequalities, inequalities, limits, continuous functions, and the derivatives of functions.  - Knowledge: Overview of fundamental algebraic mathematics knowledge. Recognizing current issues in teaching. Describing methods of teaching mathematics.  - Skills & competences: cognitive and practical abilities to use this knowledge in solving mathematics problems. Selecting appropriate tools for teaching mathematics. Formulating ideas for organizing new teaching approaches suitable for each student group |
| Content | This module includes the following topics:   1. Propositions-set-function, 2. Equations, Inequalities and systems of equations, Equations, 3. Inequalities involving absolute value, Equations, 4. Inequalities involving square roots, Inequalities, 5. Combinatorics 6. Probability 7. Sequences 8. Arithmetic progressions, 9. Limits of functions, continuous functions, 10. Derivatives of functions |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | Main textbook:   1. Đoàn Quỳnh, Nguyễn Huy Đoan, Nguyễn Xuân Liêm, Đặng Hùng Thắng, Trần Văn Vuông, Đại số lớp 10, NXB Giáo Dục Việt Nam, 2006 2. Đoàn Quỳnh, Nguyễn Huy Đoan, Nguyễn Xuân Liêm, Nguyễn Khắc Minh, Đặng Hùng Thắng, Đại số và Giải tích lớp 11, NXB Giáo Dục Việt Nam, 2006   References:  Hoàng Thị Thanh Liêm, Nguyễn Thị Ninh, Nguyễn Văn Quyết, Vũ Thụ, Thực hành giải toán sơ cấp tập 1, NXB Giáo Dục Việt Nam, 1986. |

#### 7. Methods of Teaching Mathematics 2- MTH10111

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| Module designation | Methods of Teaching Mathematics 2 |
| Semester(s) in which the module is taught | 6th semester |
| Person responsible for the module | MSc. Pham Hoang Hai  MSc. Nguyen Do Truong An |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lecture |
| Workload (incl. contact hours, self-study hours) | 180 Hours  Contact hours: Lectures: 30 hours (in class); 30 practical hours  Private study: 120 hours (self-study) |
| Credit points | 3 Credits (5 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | This course equips students with the ability to solve, classify exercises, present textbooks, and to be able to teach high-school Mathematics.  Knowledge: Provide an overview of fundamental geometric mathematics knowledge.  Skills & competences: Apply teaching and learning methods and educational psychology to the organization and management of classroom processes |
| Content | This module includes the following topics:   1. Methods of preparation of lesson plan and exercises 2. The scalar product and applications 3. Coordination method in plane 4. Transformation and similarity in planes 5. Parallel in space 6. Vector in space, perpendicular 7. Polyhedron and their volumes 8. Spheres, Cylinder, Cones |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | Main textbook:   1. Đoàn Quỳnh, Văn Như Cương, Phạm Vũ Khuê, Bùi Văn Nghị, Hình học lớp 10, NXB Giáo dục, 2006. 2. Đoàn Quỳnh, Văn Như Cương, Phạm Khắc Ban, Tạ Mân, Hình học lớp 11, NXB Giáo dục, 2007. 3. Đoàn Quỳnh, Văn Như Cương, Phạm Khắc Ban, Lê Huy Hùng, Tạ Mân, Hình học lớp 12, NXB Giáo dục, 2008. 4. Văn Như Cương, Phạm Hữu Khuê, Trần Hữu Nam, Bài tập hình học lớp 10, NXB Giáo dục, 2006   References:   1. Văn Như Cương, Phạm Khắc Ban, Tạ Mân. Bài tập hình học lớp 11, NXB Giáo dục, 2007. 2. Văn Như Cương, Phạm Khắc Ban, Lê Huy Hùng, Tạ Mân. Bài tập hình học lớp 12. NXB Giáo dục, 2008 3. Tài liệu bồi dưỡng giáo viên thực hiện chương trình, sách giáo khoa lớp 10 THPT, môn toán học, NXB Giáo dục, 2006. 4. Tài liệu bồi dưỡng giáo viên thực hiện chương trình, sách giáo khoa lớp 11, môn toán. NXB Giáo dục, 2007. 5. Hướng dẫn thực hiện chương trình, sách giáo khoa lớp 12, môn toán. NXB Giáo dục, 2008. |

#### 8. Pedagogical Practice - MTH10112

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| Module designation | Pedagogical Practice |
| Semester(s) in which the module is taught | 7th semester |
| Person responsible for the module | MSc. Dinh Thi Kim Lien |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lecture |
| Workload (incl. contact hours, self-study hours) | 360 Hours  Contact hours: Lectures: 120 practical hours (in class)  Private study: 240 hours (self-study) |
| Credit points | 4 Credits (8 ECTS) |
| Required and recommended prerequisites for joining the module | Pedagogical Psychology, General Education, Didactic of Teaching, Methods of Teaching mathematics 1, Methods of Teaching mathematics 2. |
| Module objectives/intended learning outcomes | The course covers the internship process in pedagogy, specifically focusing on the responsibilities of homeroom activities and teaching at secondary schools. It involves organizing teaching and classroom management, activities related to lesson planning, and writing internship reports to create conditions for students to acquire extensive knowledge, skills, and practical experience during the internship.  Knowledge: Organizing teaching and classroom management, activities related to lesson planning, and writing internship reports, practical experience.  Skills & competences: Developing and enhancing teaching skill. |
| Content | This module includes the following topics:   1. General overview of the pedagogical practice process 2. Homeroom teacher role practice 3. Teaching practice |
| Examination forms | Midterm and final exam: report final |
| Study and examination requirements | Overall grade: minimum 5.0/10.0. |
| Reading list | Main textbook:   1. Trường Đại học Sư phạm Tp.HCM, Quy chế thực hành nghiệp vụ sư phạm trong đào tạo giáo viên theo học chế tín chỉ , 2013 2. Bộ Giáo dục và Đào tạo, Quy chế thực tập sư phạm, 1986 |

### 2.2.3. Specialization in Mathematical Finance

#### Elementary Financial Mathematics - MTH10201

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| Module designation | Elementary Financial Mathematics |
| Semester(s) in which the module is taught | 5th semester |
| Person responsible for the module | MSc. Phan Thi Phuong |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lecture, do exercises, group work |
| Workload (incl. contact hours, self-study hours) | 165 hours  Contact hours: lectures 45 hours + 30 exercises hours.  Private study: 90 hours (self-study). |
| Credit points | 4 credits (6.5 ECTS) |
| Required and recommended prerequisites for joining the module | Calculus 1A (MTH00011), Calculus 2A (MTH00013) |
| Module objectives/intended learning outcomes | Equip students with the basic knowledge of finance and financial mathematics for discrete non-random models. |
| Content | Including the theory of interest rates, money chains, forms of borrowing, appraisal of investment projects, valuation of bonds and stocks. |
| Examination forms | Midterm and Final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | * + - 1. Toán tài chính căn bản, Đinh Ngọc Thanh, Phạm Thị Thu Hồng, Đặng Đức Trọng.       2. Risk and financial management: mathematical and computational methods, Tapiero Charlas |

#### Forecasting - MTH10202

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| Module designation | Forecasting |
| Semester(s) in which the module is taught | 5th semester |
| Person responsible for the module | Dr. Nguyen Tien Dat |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lectures, exercises, practice sessions |
| Workload (incl. contact hours, self-study hours) | 165 hours  Contact hours: lectures 30 hours + 30 exercises hours + 30 practical lessons hours.  Private study: 60 hours (self-study). |
| Credit points | 4 Credits (7 ECTS) |
| Required and recommended prerequisites for joining the module | Calculus 1A (MTH00011), Calculus 2A (MTH00013), Mathematical Statistics (MTH10404) |
| Module objectives/intended learning outcomes | Provide knowledge and skills to build quantitative models and simulations in economics. Using computer software to build computational models for forecasting problems. |
| Content | Forecasting models and methods. Regression models. Time series. |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | * + - 1. Time series: Theory and methods, Davis Richard A, Brockwell Peter J.       2. Phương pháp luận dự báo, Thống kê, 2008, Trịnh Thị Long Hương. |

#### Mathematical Finance Models - MTH10203

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| --- | --- |
| Module designation | Mathematical Finance Models |
| Semester(s) in which the module is taught | 5th semester |
| Person responsible for the module | Dr. Nguyen Dang Minh |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lecture, do exercises, group work |
| Workload (incl. contact hours, self-study hours) | 165 hours  Contact hours: lectures 45 hours + 30 practical lessons in the laboratory.  Private study: 90 hours (self-study). |
| Credit points | 4 Credits (6.5 ECTS) |
| Required and recommended prerequisites for joining the module | Elementary Financial Mathematics (MTH10201) |
| Module objectives/intended learning outcomes | Knowledge:   * + - 1. Consolidate basic and advanced knowledge of probability theory to apply to solving problems in insurance and finance       2. Consolidate knowledge about financial markets and financial instruments as the foundation for building financial models to solve practical problems.       3. Basic introduction to decision making theory.       4. Building financial risk management models.       5. Set up several pricing models.   Skills:  Applying theory to build models suitable to reality, reflecting the nature of relationships in business-finance.  Using computer software to support calculations in the subject.  Study attitude: attend school fully and do homework, ensure self-study time at home. |
| Content | This course introduces basic financial models to help students understand and apply financial knowledge to solve fundamental financial problems such as decision making, risk assessment and valuation. … in a way that has a clear scientific basis. |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | * + - 1. Phương pháp mô phỏng số Monte Carlo, Nguyễn Quý Hỷ.       2. Phương pháp Monte - Carlo và các vấn đề liên quan Ermakov X. M. |

#### Financial and Monetary Theory - MTH10204

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| --- | --- |
| Module designation | Financial and Monetary Theory |
| Semester(s) in which the module is taught | 5th semester |
| Person responsible for the module | MSc. Nguyen Huu Toan  MSc. Phan Thi Phuong |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lecture, do exercises, group work |
| Workload (incl. contact hours, self-study hours) | 165 hours  Contact hours: lectures 45 hours + 30 exercises hours.  Private study: 90 hours (self-study). |
| Credit points | 4 Credits (6.5 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | General Objective: This course explores issues related to interest rates, and how financial markets and financial institutions work. This course is divided into 5 parts. Part 1 provides an overview of the financial system, how interest rates are calculated, and how interest rates are structured. Part 2 explores how the debt securities market works. Part 3 learns about the stock market. Part 4 explores the derivatives market. Section 5 explores the activities of commercial banks and non-banks. |
| Content | Overview of the financial system and financial institutions. Debt stock market. Market share. Derivatives stock market. Commercial banks and non-banking organizations. |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | * + - 1. Chiến tranh tiền tệ, Song Hongbing.       2. Vấn đề đổi mới chính sách Tài chính- Tiền tệ, kiểm soát lạm phát ở Việt Nam và kinh nghiệm của Nhật Bản, Nhà xuất bản chính trị quốc gia. |

#### Advanced Financial Mathematics - MTH10209

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| Module designation | Advanced Financial Mathematics |
| Semester(s) in which the module is taught | 7th semester |
| Person responsible for the module | Prof. Dang Duc Trong  MSc. Phan Thi Phuong |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lecture, do exercises, group work |
| Workload (incl. contact hours, self-study hours) | 165 hours  Contact hours: lectures 45 hours + 30 practical lessons in the laboratory.  Private study: 90 hours (self-study). |
| Credit points | 4 credits (6.5 ECTS) |
| Required and recommended prerequisites for joining the module | Elementary Financial Mathematics (MTH 10201) |
| Module objectives/intended learning outcomes | Equip students with advanced knowledge of finance and financial mathematics for discrete stochastic and continuous models. |
| Content | Covers the basic theory of market derivatives, forwards, options, and swaps. |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | * + - 1. Toán tài chính nâng cao, Đinh Ngọc Thanh, Phạm Thị Thu Hồng, Đặng Đức Trọng.       2. An introduction to options and futures, The Dryden, 1989, Chance Don M. |

### 2.2.4. Specialization in Optimization

#### Operations Research - MTH10446

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| --- | --- |
| Module designation | Operations Research |
| Semester(s) in which the module is taught | 5th semester |
| Person responsible for the module | MSc. Nguyen Van Thuy |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lecture, do exercises, group work |
| Workload (incl. contact hours, self-study hours) | 180 Hours  Contact hours: Lectures: 60 hours (in class)  Private study: 120 hours (self-study) |
| Credit points | 4 Credits (6 ETCS) |
| Required and recommended prerequisites for joining the module | Recommended prerequisites: Linear Programming (MTH10449) |
| Module objectives/intended learning outcomes | Provide students with knowledge and applications of linear programming problems in the form of graphs, networks, and some practical applications. |
| Content | 1. Basic concepts of graphs and trees. 2. Algorithms of network problems. 3. Network diagram methods. 4. Concepts of transport problems and algorithms. |
| Examination forms | Mid-term and Final exam: Written exam |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | * + - 1. Phan Quốc Khánh, Vận trù học, NXB Giáo Dục, 2004.  1. Phan Quốc Khánh, Trần Huệ Nương, Quy hoạch tuyến tính, NXB Giáo Dục, 2003. |

#### Linear programming - MTH10449

|  |  |
| --- | --- |
| Module designation | Linear Programming |
| Semester(s) in which the module is taught | 5th semester |
| Person responsible for the module | Assoc. Prof. Nguyen Le Hoang Anh  MSc. Nguyen Manh Truong Giang |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lecture, do exercises, group work |
| Workload (incl. contact hours, self-study hours) | 165 hours  Contact hours: Lectures: 45 lectures hours + 30 exercises hours (in class)  Private study: 90 hours (self-study) |
| Credit points | 4 Credits (6.5 ETCS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | Provide students with the tools to solve the linear programming problem, distinguish the types of problems, the original monomorphic, dual, and synthetic methods. How to build models from real problems. |
| Content | Objective function, constraint, sign constraint, vocabulary, basis solution, extreme point, primal simplex method, duality. |
| Examination forms | Mid-term and Final exam: Written exam |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | 1. Phan Quốc Khánh, Trần Huệ Nương, Quy hoạch tuyến tính, NXB Giáo Dục, 2003. 2. V. Chvatal, Linear Programming, NewYork, 1983. |

#### Nonlinear programming - MTH10447

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| --- | --- |
| Module designation | Nonlinear Programming |
| Semester(s) in which the module is taught | 5th semester |
| Person responsible for the module | Assoc. Prof. Nguyen Le Hoang Anh |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lecture, do exercises, group work |
| Workload (incl. contact hours, self-study hours) | 180 Hours  Contact hours:  Lectures: 60 hours (in class)  Private study: 120 hours (self-study) |
| Credit points | 4 credits (6 ETCS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | Provide students with basic knowledge about the nonlinear programming and optimality conditions of this problem. |
| Content | 1. Concepts of differentiability in normed spaces. 2. Important theorems in nonlinear analysis: implicit functions, inverse functions, Hahn-Banach, convex set separation theorem, open mapping theorem. 3. Minimum existence theorems 4. Optimality conditions, necessary conditions, sufficient conditions, Lagrange multiplier rules. 5. Duality theorem, saddle point. |
| Examination forms | Mid-term and Final exam: Written exam |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | * + - 1. McCormick Garth P., Fiacco Anthony V, Nonlinear programming: sequential unconstrained minimization techniques, SIAM, 1990.       2. Patriksson M, Nonlinear programming and variational inequality problems: a unified approach, Springer, 2013. |

#### Optimization Models in Economics - MTH10615

|  |  |
| --- | --- |
| Module designation | Optimization Models in Economics |
| Semester(s) in which the module is taught | 5th semester |
| Person responsible for the module | MSc. Cao Nghi Thuc |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lecture, do exercises, group work |
| Workload (incl. contact hours, self-study hours) | 150 hours  Contact hours:  Lectures: 30 lecture hours + 30 exercise hours (in class)  Private study: 90 hours (self-study) |
| Credit points | 3 credits (5 ETCS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | Provides students with the basic concepts of mathematical modeling in economics. |
| Content | 1. Closed and open Leontief model, direct and indirect costs 2. Labor theory of value, substitution theorem. 3. Linear optimal model, producible set, efficient production, production constraints, consumption. 4. Nonlinear optimization model, modern theory of demand, extended theory of production. 5. Equilibrium in the market economy, budget constraints, Walras-Wald model, Arrow-Debreu-Mckenzie model. |
| Examination forms | Mid-term and Final exam: Written exam |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | * + - 1. Dowling Edward T, *Introduction to Mathematical Economics*, Schaum’s Outline Series, 2012.       2. Hoàng Đình Tuấn, *Lý thuyết mô hình toán kinh tế*, ĐH Kinh tế Quốc dân, 2007. |

#### Optimization Algorithms – MTH10450

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| --- | --- |
| Module designation | Optimization Algorithms |
| Semester(s) in which the module is taught | 6th semester |
| Person responsible for the module | Assoc. Prof. Vo Si Trong Long |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lecture, lab work, group work |
| Workload (incl. contact hours, self-study hours) | 165 hours  Contact hours:  Lectures: 45 lectures hours + 30 lab works hours (in class)  Private study: 90 hours (self-study) |
| Credit points | 4 credits (6.5 ETCS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | Provide students with knowledge and methods to solve constrained and unconstrained optimization problems. |
| Content | 1. Basic properties and concepts of algorithms, Direct/Indirect line search method for unconstrained optimization problem. 2. Deep reduction method, gradient method and conjugate gradient method. 3. Newton and quasi-Newton methods. 4. The least squares problem. Kuhn-Tucker Optimality Conditions. |
| Examination forms | Mid-term and Final exam: Written exam. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | * + - 1. Polak Elijah, Optimization: algorithms and consistent approximations, Springer, 1997.       2. Schnabel Robert B, Numerical methods for unconstrained optimization and nonlinear equations, SIAM, 1996. |

#### Introduction to Convex Analysis and Convex Programming - MTH10543

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| --- | --- |
| Module designation | Introduction to Convex Analysis and Convex Programming |
| Semester(s) in which the module is taught | 7th semester |
| Person responsible for the module | Assoc. Prof. Vo Si Trong Long |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Lecture, do exercises, group work |
| Workload (incl. contact hours, self-study hours) | 150 Hours  Contact hours:  Lectures: 60 hours (in class)  Private study: 90 hours (self-study) |
| Credit points | 4 Credits (6 ETCS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | Provide students with knowledge about convex analysis. |
| Content | 1. Convex set, affine set, Caratheodory's Theorem. 2. Convex function, quasi-convex function, lower and upper semicontinuous, continuous, Lipschitz continuous, Karamardian theorem, local minima. 3. Hahn-Banach theorem, separation form. 4. Convex programming. 5. Optimal conditions. 6. Duality theorem. |
| Examination forms | Mid-term and Final exam: Written exam |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | * + - 1. R.T. Rockafellar, *Convex Analysis*, Princeton University Press, Princeton, New Jersey, 1970       2. Boris S. Mordukhovich and Nguyen Mau Nam, *An Easy Path to Convex Analysis and Applications*, Morgan & Claypool Publishers, 2013. |

## 2.3. Elective Courses for Specialization

### 2.3.1. Specialization in Mechanics

#### 1. Mechanics Seminar - MTH10520

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| --- | --- |
| Module designation | Mechanics Seminar |
| Semester(s) in which the module is taught | 7th semester |
| Person responsible for the module | Dr. Vu Do Huy Cuong  Dr. Bui Xuan Thang  Dr. Nguyen Thi Yen Ngoc  MSc. Le Van Chanh |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Project, seminar |
| Workload (incl. contact hours, self-study hours) | Total workload: 180 hours.  Contact hours: Lectures 60 hours.  Private study including examination preparation, specified in hours: 120 hours. |
| Credit points | 4 Credits (6 ECTS) |
| Required and recommended prerequisites for joining the module | Successfully completed 124/134 credits |
| Module objectives/intended learning outcomes | After completing the course, students will be able to:   1. Apply mathematical principles to solve real-world engineering problems. This includes using calculus, linear algebra, differential equations, and other mathematical tools to analyze forces, stresses, strains, heat transfer, fluid flow, and other physical phenomena. 2. Develop and use computational models to simulate mechanical systems. This involves using software to create virtual models of machines, structures, and other systems, and then running simulations to predict their behavior under different conditions. 3. Design and analyze mechanical systems. This involves applying the principles of mechanics, materials science, and thermodynamics to create new machines, devices, and structures. 4. Present and defend the results of the project at the Students’ Seminar Conference. |
| Content | Various topics |
| Examination forms | Essay, oral presentation |
| Study and examination requirements | Minimum attendance at weekly meetings is 80%. Final defense is required. Final score is greater or equal to 5.0/10.0 |
| Reading list | Diverse documents depend on the instructor. |

#### 2. Symbolic Programming for Applied Problems - MTH10611

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| --- | --- |
| Module designation | Symbolic Programming for Applied Problems |
| Semester(s) in which the module is taught | 6th semester |
| Person responsible for the module | Dr. Vu Do Huy Cuong |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Lecture, group work |
| Workload (incl. contact hours, self-study hours) | 165 hours  Contact hours:  Lectures 45 hours + 30 practical lessons in the laboratory.  Private study: 90 hours *(self-study).* |
| Credit points | 4 Credits (6.5 ECTS) |
| Required and recommended prerequisites for joining the module | Linear Algebra, and Programming. |
| Module objectives/intended learning outcomes | General Objective: To guide learners in using computers to assist in simulating and solving mechanical and real-world problems.  Specific objectives/course output standards:  Knowledge: After completing the course, students will understand the principles behind certain physical and man-made phenomena in daily life. They will be able to solve (exact solutions) and simulate (using computer software) these phenomena.  Skills: Computational programming, Apply concepts and laws to mathematically model to real problems.  Attitude and diligence: After the course, students will understand and be interested in the computing and simulation of mathematical mechanics for real problems. |
| Content | This course introduces and provides the foundation knowledge for the modules of Symbolic programming.   1. Symbolic programming with Matlab 2. Kinematics problem 3. Optimization problem 4. Heat transfer problem, wave propagation problem |
| Examination forms | written exams, lab |
| Study and examination requirements | Tests – process score: 35%  Final exam: 65 % |
| Reading list | * + - 1. Lập trình symbolic với Matlab cho các bài toán ứng dụng, Vũ Đỗ Huy Cường, 2016.       2. Cơ học giải tích, Ngô Thành Phong, 2002 |

### 2.3.2. Specialization in Didactics and Methodology of Mathematics Teaching

#### 1. Quality and Quality Management – MTH10103

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| Module designation | Quality and Quality Management |
| Semester(s) in which the module is taught | 8th semester |
| Person responsible for the module | MSc. Dinh Thi Kim Lien |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Lecture |
| Workload (incl. contact hours, self-study hours) | 180 Hours  Contact hours: Lectures: 30 hours (in class), 30 practical hours  Private study: 120 hours (self-study) |
| Credit points | 3 Credits (5 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | The course addresses issues related to quality, quality management, total quality management, continuous improvement through Kaizen, applied to enhancing teaching through lesson research   1. Knowledge: Identifying practical education issues and methods to enhance teaching quality. 2. Skills & competences: Developing and enhancing presentation skills, scientific report writing and analysing data. |
| Content | This module includes the following topics:  Quality and Customers.  Total Quality Management (TQM).  Culture and cultural scripts.  Continuous improvement through Kaizen.  Continuous improvement in choices. |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | Main textbook:   1. Japan Human Relations Association, Guiding continuous improvement through employee suggestions, 1997 2. James W. Stigler, J. Hiegert, NXB Trẻ, Lỗ hỗng giảng dạy, 2012 3. Bộ GDĐT, Dự án Việt – Bỉ Nghiên cứu khoa học Sư phạm ứng dụng, 2009.   References:   1. Business Edge Tìm hiểu chất lượng, 2003. 2. Business Edge Đạt chất lượng, 2003 3. Business Edge Đánh giá chất lượng, 2003 4. E. F. Crawley, J. Malmqvist, S. Oslund, D. R. Brodeur, Rethinking Engineering Education: The CDIO Approach, 2007. |

#### 2. Elementary Algebra – MTH10121

|  |  |
| --- | --- |
| Module designation | Elementary Algebra |
| Semester(s) in which the module is taught | 6th semester |
| Person responsible for the module | Dr. Ta Thi Nguyet Nga |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Lecture |
| Workload (incl. contact hours, self-study hours) | 180 Hours  Contact hours: Lectures: 60 hours (in class)  Private study: 120 hours (self-study) |
| Credit points | 4 Credits (6 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | This course addresses issues related to methods and strategies for solving problems, equations and systems of equations, inequalities and extremum conditions, combinatorial algebra, and methods for solving problems related to sequences and series.   1. Knowledge: Overview of foundational knowledge in algebra. 2. Skills & competences: Selecting appropriate theoretical foundations to solve corresponding exercises. Proactively updating and improving new teaching methods. |
| Content | This module includes the following topics:   1. Methods and strategies for problem solving. 2. Equations and systems of equations 3. Inequalities and extremum 4. Combinatorial algebra 5. Methods for solving problems of sequences and series. |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | Main textbook:   1. Đoàn Quỳnh, Đại số 10 nâng cao, NXB Giáo Dục Việt Nam, 2006. 2. Đoàn Quỳnh, Đại số và Giải tích 11 nâng cao, NXB Giáo Dục Việt Nam, 2007. 3. Đoàn Quỳnh, Giải tích 12 nâng cao, NXB Giáo Dục Việt Nam, 2008.   References:   1. Đoàn Quỳnh, Tài liệu giáo khoa chuyên Toán - Đại số 10, NXB Giáo Dục Việt Nam, 2009. 2. Đoàn Quỳnh, Tài liệu giáo khoa chuyên Toán - Đại số và Giải tích 11, NXB Giáo Dục Việt Nam, 2010. 3. Đoàn Quỳnh, Giải tích 12 nâng cao, NXB Giáo Dục Việt Nam, 2011. |

#### 3. Elementary Geometry– MTH10122

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| --- | --- |
| Module designation | Elementary Geometry |
| Semester(s) in which the module is taught | 6th semester |
| Person responsible for the module | Dr. Tran Nam Dung |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Project, seminar |
| Workload (incl. contact hours, self-study hours) | 180 Hours  Contact hours: Lectures: 60 hours (in class)  Private study: 120 hours (self-study) |
| Credit points | 4 Credits (6 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | This course equips students with skills in analysis, geometric problem-solving, methods, and problem-solving strategies   1. Knowledge: important knowledge to solve geometry problems. 2. Skills & competences: cognitive and practical abilities to use this knowledge in solving geometry problems. |
| Content | This module includes the following topics:   1. Methods and Strategies for Problem Solving 2. Solving Problems using Vector Methods 3. Solving Problems using Transformations 4. Coordinate Methods in Plan 5. Coordinate Methods in Space 6. Methods for solving three-dimensional geometry problems |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | Main textbook:   1. Đoàn Quỳnh (Tổng chủ biên), Hình học 10 nâng cao, NXB Giáo dục 2006. 2. Đoàn Quỳnh (Tổng chủ biên), Hình học 11 nâng cao, NXB Giáo dục 2007. 3. Đoàn Quỳnh (Tổng chủ biên), Hình học 12 nâng cao, NXB Giáo dục 2008.   References:   1. Đoàn Quỳnh (Chủ biên), Tài liệu giáo khoa chuyên Toán-Hình học 10, NXB Giáo dục 2009. 2. Đoàn Quỳnh (Chủ biên), Tài liệu giáo khoa chuyên Toán-Hình học 11, NXB Giáo dục 2010. 3. Đoàn Quỳnh (Chủ biên), Tài liệu giáo khoa chuyên Toán-Hình học 12, NXB Giáo dục 2011. |

#### 4. Application of Advanced Mathematical Methods in Solving Complex High School's Mathematics Problem – MTH10123

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| Module designation | Application of Advanced Mathematical Methods in Solving Complex High School's Mathematics Problem |
| Semester(s) in which the module is taught | 7th semester |
| Person responsible for the module | Dr. Ta Thi Nguyet Nga |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Lecture |
| Workload (incl. contact hours, self-study hours) | 180 Hours  Contact hours:  Lectures: 60 hours (in class)  Private study: 120 hours (self-study) |
| Credit points | 4 Credits (6 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | Equip students with advanced mathematical knowledge through various applications to solve problems in the high school curriculum. This helps students reinforce and enhance their advanced mathematical knowledge, while also teaching them how to solve everyday problems using modern and elegant tools.   1. Knowledge: advanced mathematical knowledge in solving problems 2. Skills & competences: solving everyday problems using modern and elegant tools. |
| Content | This module includes some of the following topics: (change over year)   1. Applications of Mathematical Analysis 2. Applications of Advanced Geometry 3. Applications of Graph Theory 4. Applications of Group Theory 5. Applications of Symmetric Polynomials |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | Main textbook:   1. Nguyễn Viết Đông, Lê Thị Thiên Hương, Nguyễn Anh Tuấn, Lê Anh Vũ, Toán học cao cấp Tập I, NXB GD,1999. 2. Nguyễn Viết Đông, Trần Ngọc Hội, Đại số đại cương, NXB ĐHQG TP.HCM,2004. 3. Văn Như Cương, Kiều Huy Luân, Hình học cao cấp, NXBGD, 1976. 4. Nguyễn Mộng Hy, Các bài toán về phương pháp vectơ và phương pháp tọa độ, NXBGD, 2007.   References:   1. Đặng Hùng Thắng, Một số kiến thức cơ sở về graph hữu hạn, NXB GD, 2004 2. Hà Huy Khoái, Chuyên đề bồi dưỡng số học THPT, NXB GD, 2006 3. J. Rotman, An introduction to the theory of group, Springer - Verlag, 1999. 4. K.H. Rosen, Discrete Mathematics and Its Aplications, Addison – Wesley Publishing Company, 1993. |

#### 5. Classroom Management and Organization - MTH10124

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| --- | --- |
| Module designation | Classroom Management and Organization |
| Semester(s) in which the module is taught | 7th semester |
| Person responsible for the module | MSc. Phan Nguyen Ai Nhi  MSc. Chau Thi Hieu |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Lecture, lab work, project |
| Workload (incl. contact hours, self-study hours) | 270 Hours  Contact hours: Lectures: 30 hours (in class), 60 practical hours  Private study: 180 hours (self-study) |
| Credit points | 4 Credits (7 ECTS) |
| Required and recommended prerequisites for joining the module | Pedagogical Psychology (MTH10101) |
| Module objectives/intended learning outcomes | The course provides an overview of issues related to classifying learners, the adaptability between teaching methods and assessment (TM&A) for each learner category. It particularly emphasizes the effective organization and management of the classroom, preparing future teachers with the necessary skills for learners.   1. Knowledge: Overview of the foundational knowledge of the process of classroom organization and management. Presents the psychophysiological characteristics of each age group of students. Classifies and interacts effectively with each group of students. 2. Skills & competences: Analyze the effectiveness of teaching methods. Select appropriate assessment methods for each specific content and audience. Cultivate the ability to work independently, study, and conduct comprehensive research |
| Content | This module includes the following topics:   1. Classify learner groups, 2. Adaptability between teaching methods and assessment (TM&A) for each learner group, 3. Organize and manage the classroom |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | Main textbook:   1. Phan Nguyễn Ái Nhi, Tổ chức và quản lý lớp học, 2014 2. Đặng Thành Hưng, Tương tác hoạt động Thầy – Trò trên lớp học, NXB Đại học Quốc gia Hà Nội, 2007   References:   1. Jeffrey S. Lantis, Lynn M. Kuzma, John Boehrer. The New International Studies Classroom - Active Teaching, Active Learning, Lynne Rienner Publishers, 2000 2. Klafi, W., Studien zur Bildungstheorie und Didaktik, 1975 3. Meyer, H. L., Trainings programm zur Lernziel analysis, 1976 4. Research Council, How People Learn: Brain, Mind, Experience, and School: Expanded Edition National, 2000 5. Peter Filene, The Joy of Teaching: A Practical Guide for New College Instructors, University of North Carolina Press, 2005. |

#### 6. Classroom Assessment Techniques – MTH10125

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| --- | --- |
| Module designation | Classroom Assessment Techniques |
| Semester(s) in which the module is taught | 7th semester |
| Person responsible for the module | MSc. Phan Nguyen Ai Nhi  MSc. Chau Thi Hieu |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Lecture, lab work, project |
| Workload (incl. contact hours, self-study hours) | 150 Hours  Contact hours: Lectures: 30 hours (in class); 30 practical hours  Private study: 90 hours (self-study) |
| Credit points | 3 Credits (5 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | This course is oriented towards researching the roles, characteristics, principles, and forms of assessment, as well as the techniques and tools of assessment. It also focuses on establishing standardized evaluation systems to support the future teaching process of learners.   1. Knowledge: Recognizing the roles of teaching and assessment. Gaining an overview of assessment techniques and tools. 2. Skills & competences: Constructed appropriate assessment rubrics, compiled exams compatible with course learning outcomes, applied flexible teaching methods to organize classes. |
| Content | This module includes the following topics:   1. General Overview 2. Assessment Techniques 3. Rubric - an Effective Assessment Tool 4. Organizing Assessment in Teaching. |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | Main textbook:   1. Thomas A. Angelo & K. Patricia Cross , Classroom Assessment Techniques: A Handbook for College Teachers, Jossey-Bass, 1993 2. Linda Suskie, Assessing Student Learning, Jossey-Bass, 2009   References:   1. Barbara Gross David, Tools for Teaching, Jossey-Bass, 2009 2. Mensa, Keep Your Brain Fit, Carlton Books Ltd, 2007 3. National Research Council, How People Learn: Brain, Mind, Experience and School, National Academies Press, 2000 4. Robert S. Feldman, Power Learning, McGraw-Hill, 2003 5. Steve Frankland, Enhancing Teaching and Learning through Assessment, Springer, 2000. |

#### 7. Pedagogy Seminar - MTH10126

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| --- | --- |
| Module designation | Pedagogy Seminar |
| Semester(s) in which the module is taught | 7th semester |
| Person responsible for the module | Dr. Tran Nam Dung  MSc. Phan Nguyen Ai Nhi  MSc. Chau Thi Hieu  Dr. Ta Thi Nguyet Nga |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Seminar, project |
| Workload (incl. contact hours, self-study hours) | 180 Hours  Contact hours:  Lectures: 60 hours (in class)  Private study: 120 hours (self-study) |
| Credit points | 4 Credits (6 ECTS) |
| Required and recommended prerequisites for joining the module | General Education, |
| Module objectives/intended learning outcomes | After completing this course, students will be able to identify issues related to education and mathematics, classify the learning environment, assess influencing factors, and apply appropriate teaching methods and assessment techniques. Additionally, they will analyze core factors in the new educational direction, develop teaching skills in accordance with the designed curriculum, and engage in discussions on specialized topics throughout each week.   1. Knowledge: List of the fundamental factors of the educational curriculum and mathematics. Determine the learning outcomes, teaching methods, and assessment techniques. Classify the learning environment and influence factors. Provide an overview of new educational perspectives and directions. 2. Skills & competences: Foster a sense of self-directed learning. Cultivate community service awareness. |
| Content | This module includes the following topics:   * + - 1. Overview of Building a Positive Learning Environment       2. Three Specialized Topics (Students may propose topics for research and reporting on their own)       3. Teaching: 3 Specialized Topics       4. Teaching according to Gregorc/Anthony perspectives and the approaches of education innovators worldwide.       5. Teaching with the CDIO approach.  1. STEM/STEAM Education. 2. Assessment: 2 Specialized Topics 3. The influence of assessment in the teaching-learning process and proposed recommendations. 4. Building a Rubric system for assessing teaching and learning activities. 5. Mathematics: 3 Specialized Topics 6. How to help students excel in mathematics? 7. Solutions to support students with disabilities in learning mathematics/developing critical thinking. 8. Building a repository of scenarios/games/model systems, etc., to support the teaching and learning of mathematics. |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | Main textbook:   1. Cynthia Ulrich Tobias, Mỗi đứa trẻ một cách học, NXB. Lao động Xã hội, 2012. 2. Nguyễn Tiến Dũng, Học và dạy Toán như thế nào, Sputnik, 2015 3. Edward F. Crawley, Johan Malmqvist, Soeren Oestlund, Doris Brodeur and Christina Edstroem, Rethinking Engineering Education: the CDIO Approach, Springer, 2007 4. National Research Council, Successful K-12 STEM Education, National the National Research Academies Council Press, Washington, D.C, 2011   References:   1. Anne Bayetto, Teaching students with learning difficulties in Mathematic, SPELD SA, 2015 2. James Bellanca, 200+ Active Learning Strategies and Projects, Corwin Press, 2009 3. Giselle O., Martin-Kniep, Become A Better Teacher, ASCD, 2000 4. Ken Bain, What the Best College Teachers Do, Harvard University Press, 2004 5. Robert J. Marzano, Classroom Management that Works, ASCD, 2003 6. Peter Filene, The Joy of Teaching: A Practical Guide for New College Instructors, The University of North Carolina Press, 2005 7. Steve Frankland, Enhancing Teaching and Learning through Assessment, Springer Netherlands, 2010 8. Linda Suskie, Assessing Student Learning, Jossey-Bass, 2009 9. Thomas A., Angelo, K., Patricia Cross, Classroom Assessment Techniques, Jossey-Bass, 1993 |

#### 8. Teaching Mathematics in English 1 - MTH10119

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| Module designation | Teaching Mathematics in English 1 |
| Semester(s) in which the module is taught | Both 6th and 7th semester |
| Person responsible for the module | Dr. Ta Thi Nguyet Nga |
| Language | English |
| Relation to curriculum | Elective |
| Teaching methods | Lecturing, discussion, think-paire-share, Project-based learning, |
| Workload (incl. contact hours, self-study hours) | 90 Hours  Contact hours: Lectures: 30 hours (in class)  Private study: 60 hours (self-study) |
| Credit points | 2 credits (3 ECTS) |
| Required and recommended prerequisites for joining the module | none |
| Module objectives/intended learning outcomes | This course is designed to equip students with the skills and strategies needed to effectively teach mathematics using English as the medium of instruction. Participants will explore techniques for creating a language-rich math classroom, fostering mathematical communication, and supporting English language learners in understanding and solving mathematical problems. The course aims to empower students to facilitate a seamless integration of mathematics and language learning.  By the end of this course, students should be able to:   1. Understand the importance of the structure and concepts in teaching mathematics in English. 2. Develop strategies for explaining mathematical concepts clearly in English. 3. Promote mathematical communication and language development. 4. Adapt instructional materials to support English language learners. 5. Create a language-rich math classroom environment. 6. Evaluate the effectiveness of English-medium math instruction. |
| Content | 1. Operation Review 2. Algebra 3. Basic Geometry 4. Trigonometry 5. Probability and Statistics 6. Calculus |
| Examination forms | Class Participation and Engagement: 10%  Assignments: 20%  Midterm Exam: 30%  Final project: 40% |
| Study and examination requirements | None |
| Reading list | 1. Robert F. Blitzer, Algebra and Trigonometry, Pearson, 2022. 2. Karen Morrison, Nick Hamshaw, and Dea Susanto. Cambridge IGCSE® Mathematics Core and Extended Coursebook. 3rd Edition, Cambridge University Press, 2023. |

#### 9. Teaching Mathematics in English 2 - MTH10120

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| --- | --- |
| Module designation | Teaching Mathematics in English 2 |
| Semester(s) in which the module is taught | 8th semester |
| Person responsible for the module | Dr. Ta Thi Nguyet Nga |
| Language | English |
| Relation to curriculum | Elective |
| Teaching methods | Lecturing, discussion, think-paire-share, Project-base learning, |
| Workload (incl. contact hours, self-study hours) | 90 Hours  Contact hours: Lectures: 30 hours (in class)  Private study: 60 hours (self-study) |
| Credit points | 2 Credits (3 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | This course is designed to equip students with the skills and strategies needed to teach mathematics effectively using English as the medium of instruction. Learners will explore methods for creating a language-rich learning environment, fostering mathematical communication, and supporting students in developing mathematical thinking through English. The course focuses on the seamless integration of mathematical content and language skills, enabling educators to deliver clear, comprehensible, and effective instruction.  By the end of this course, students should be able to:   1. Understand and analyze the linguistic and cognitive aspects of teaching mathematics in English, as well as the challenges students may face. 2. Develop effective teaching strategies for explaining mathematical concepts in English with clarity, accuracy, and appropriateness for different student groups. 3. Encourage mathematical communication by using precise language to explain, discuss, and present mathematical ideas 4. Select and adapt instructional materials to accommodate students with varying levels of English proficiency while maintaining mathematical rigor and depth 5. Create a language-rich classroom environment that fosters mathematical thinking through discussions, collaboration, and presentations in English. 6. Assess and refine the effectiveness of English-medium math instruction based on student feedback and appropriate pedagogical criteria. |
| Content | 1. General of Teaching math in English 2. Teaching Algebra 3. Teaching Geometry 4. Teaching Probability and Statistics 5. Teaching Calculus |
| Examination forms | Class Participation and Engagement: 10%  Assignments: 20%  Midterm Exam: 30%  Final project: 40% |
| Study and examination requirements | None |
| Reading list | James Stewart. Calculus: Early Transcendentals. 8th Edition, Brooks/Cole, Cengage Learning, 2015. |

### 2.3.3. Specialization in Mathematical Finance

#### 1. Quantitative Microeconomics - MTH10214

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| --- | --- |
| Module designation | Quantitative Microeconomics |
| Semester(s) in which the module is taught | 5th semester |
| Person responsible for the module | MSc. Dinh Ngoc Tin  MSc. Phan Thi Phuong |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Lecture, do exercises, group work |
| Workload (incl. contact hours, self-study hours) | 165 hours  Contact hours: lectures 45 hours + 30 exercises hours.  Private study: 90 hours (self-study). |
| Credit points | 4 Credits (6.5 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | Equip students with basic knowledge of finance, financial market operations and financial mathematics for discrete non-random models. |
| Content | Including the theory of supply and demand model, inflationary, competitive market, and the state policy. |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | Calculus for business, economics, and the social and life sciences, Hoffmann Laurence D., Bradley Gerald L, 2007.  Mathematical economics, Dowling Edward T, 2006. |

#### 2. Corporate finance - MTH10217

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| --- | --- |
| Module designation | Corporate finance |
| Semester(s) in which the module is taught | 7th semester |
| Person responsible for the module | MSc. Dinh Ngoc Tin  MSc. Nguyen Huu Toan |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Lecture, exercises |
| Workload (incl. contact hours, self-study hours) | 150 Hours  Contact hours: Lectures 45 hours *(in class);* 30 practical hours  Private study: 75 hours *(self-study)* |
| Credit points | 4 Credits (6.5 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | Capital and capital resources of the enterprise. Cost of capital and capital investment decisions of enterprises. Securities valuation and business valuation.   1. Knowledge: Understand the three basic issues of corporate finance, including which fields to invest in, how to properly mobilize funding sources, and how the business will have to manage daily financial activities. Master the concept of working capital, determine the structure of mobilized capital in a way that ensures minimizing mobilization costs, increasing value for the business while still controlling risks for the business. 2. Skills & competencies: Investment planning (Capital Budgeting). The ability to discover investment opportunities that are likely to generate income that exceeds the cost of financing the implementation of that investment. Determine the structure of mobilized capital to ensure minimizing mobilization costs, increasing value for the business, while still controlling risks for the business. |
| Content | This module includes the following topics:   * + - 1. Introduction to corporate finance.  1. Discounted cash flow technique. 2. Net present value and investment project appraisal methods. 3. Investment decision. 4. Interest rates and bond pricing. 5. Stock valuation. 6. Risk and return: Lessons from the past. 7. Risk and return: Capital asset pricing model (CAPM) |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | Main textbook: Madura Jeff, *International corporate finance,* CENGAGE,2006.  References:   * + - 1. Bettner Mark, Meigs Robert F., Whittington Ray , Meigs Mary A, *Financial accounting : study guide*, Irwin/McGraw-Hill, 1998.       2. Ferris Kenneth R, *Financial accounting and corporate reporting*, McGraw-Hill Education,1996. |

#### 3. Financial Analysis - MTH10219

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| --- | --- |
| Module designation | Financial Analysis |
| Semester(s) in which the module is taught | 7th semester |
| Person responsible for the module | MSc. Dinh Ngoc Tin  MSc. Nguyen Huu Toan |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Lecture, exercise |
| Workload (incl. contact hours, self-study hours) | 150 Hours  Contact hours: Lectures 45 hours *(in class);* 30 exercises hours  Private study: 75 hours *(self-study)* |
| Credit points | 4 Credits (6.5 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | Financial reports. Analyze financial statements, treasury, financing activities, investment activities, income, and net cash flow.   1. Knowledge: Provides students with basic knowledge related to the establishment and analysis of financial reports such as balance sheets, business performance reports, and cash flow statements. 2. Skills & competencies: cognitive and practical abilities to use this knowledge in presenting and analyzing data. |
| Content | This module includes the following topics:   * + - 1. Overview of financial statement analysis.  1. Introducing financial reports. 2. Analyze financial ratios. 3. fund analysis and cash flow reports. 4. Analyze sponsorship activities. 5. Analyze investment activities 6. Income analysis 7. Cash flow analysis |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | Main textbook: W. Steve Albrecht, Earl K. Stice, James D Stice, Ferris Kenneth R., *Financial accounting and corporate reporting,* Cengage Learning, 1996.  References:   1. Bettner Mark, Meigs Robert F., Whittington Ray, Meigs Mary A., *Financial accounting: study guide*, Irwin/McGraw-Hill, 1998. 2. Madura Jeff, *International corporate finance,* South-Western, Div of Thomson, 2006. |

#### 4. Basic Actuarial Mathematics - MTH10220

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| --- | --- |
| Module designation | Basic Actuarial Mathematics |
| Semester(s) in which the module is taught | 6th semester |
| Person responsible for the module | Dr. Tra Quoc Khanh |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Lectures, group work, small group solving exercises |
| Workload (incl. contact hours, self-study hours) | 165 hours  Contact hours: lectures 45 hours + 30 exercises hours.  Private study: 90 hours *(self-study).* |
| Credit points | 4 Credits (6.5 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | General objectives: To gain basic concepts/knowledge on (long-term) actuarial mathematics.  Specific objectives/course learning outcomes:   1. Knowledge: To explore basic concepts/notation of long-term actuarial mathematics. To explore how the net premium (or pure premium) is calculated for basic life insurance products. 2. Skills: Calculation skills/ self-study skill. 3. Attitude: Attend all classroom sessions, and discussions outside of class time. |
| Content | This module includes the following topics:   1. Introduction to Life Insurance (or Long-term Insurance) 2. Survival Probabilities 3. Life Table 4. Life Insurance 5. Life Annuities 6. Net Premium Calculation 7. Gross Premium Calculation |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Attendance and Quizzes: 10%,  Midterm: 30%,  Final: 60% |
| Reading list | * + - 1. D. C. M. Dickson, M. R. Hardy and H. R. Waters, Actuarial mathematics for life contingent risks, Cambridge University Press, 2009.       2. Newton L. Bowers et al, Actuarial Mathematics, Society of Actuaries, 1997.       3. Robin Cunningham et al, Models for Quantifying risk, ACTEX publication, 2012. |

#### 5. Advanced Actuarial Mathematics - MTH10221

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| --- | --- |
| Module designation | Advanced Actuarial Mathematics |
| Semester(s) in which the module is taught | 7th semester |
| Person responsible for the module | Dr. Tra Quoc Khanh |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Lectures, group work, small group solving exercises |
| Workload (incl. contact hours, self-study hours) | 165 hours  Contact hours: lectures 45 hours + 30 exercises hours.  Private study: 90 hours *(self-study).* |
| Credit points | 4 credits (6.5 ECTS) |
| Required and recommended prerequisites for joining the module | Basic Actuarial Mathematics |
| Module objectives/intended learning outcomes | General objectives: To deep dive on the advanced concepts of (long-term) actuarial mathematics.  Specific objectives/course learning outcomes:   1. Knowledge: To explore advanced concepts of long-term actuarial mathematics: Reserve, Multiple Decrements model, Multiple Lives model, Multiple States model, Universal Life Insurance, Pension Mathematics. 2. Skills: Calculation skills/ self-study skill. 3. Attitude: Attend all classroom sessions, and discussions outside of class time. |
| Content | This module includes the following topics:   1. Reserve 2. Multiple Decrements Model 3. Multiple Lives Model 4. Multiple States Model 5. Universal Life Insurance 6. Pension Mathematics |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Attendance and Quizzes: 10%  Midterm: 30%,  Final: 60% |
| Reading list | 1. D. C. M. Dickson, M. R. Hardy and H. R. Waters, Actuarial mathematics for life contingent risks, Cambridge University Press, 2009. 2. Newton L. Bowers et al, Actuarial Mathematics, Society of Actuaries, 1997. 3. Robin Cunningham et al, Models for Quantifying risk, ACTEX publication, 2012. |

### 2.3.4. Specialization in Optimization

#### 1. Seminar on Optimization – MTH10616

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| Module designation | Seminar on Optimization |
| Semester(s) in which the module is taught | 7th semesters |
| Person responsible for the module | Assoc. Prof. Nguyen Le Hoang Anh |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | project, seminar, group work |
| Workload (incl. contact hours, self-study hours) | 180 Hours  Contact hours: Lectures: 60 hours (in class)  Private study: 120 hours (self-study) |
| Credit points | 4 credits (6 ETCS) |
| Required and recommended prerequisites for joining the module | This course is only for students who meet the following conditions:  Overall grade: at least 6.5/10 at the time of registration.  Graduatation with a major in Optimization. |
| Module objectives/intended learning outcomes | Learn more about the Optimization major and prepare for your graduation thesis. |
| Content | Students will work directly with instructors on a topic. Topic content can be:  Issues that have not been mentioned in the subjects of the Optimization major.  Problems that arise in Optimization subjects but have not been resolved.  The latest results from around the world and upcoming results from professors, lecturers, and graduate students of the Department of Optimization and Systems. |
| Examination forms | Mid-term and Final exam: report (or written exam, if necessary) |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | Updated from the latest scientific information depending on the discussion content and provided by the instructor. |

#### 2. Multi-objective Optimization - MTH10553

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| Module designation | Multi-objective Optimization |
| Semester(s) in which the module is taught | 8th semester |
| Person responsible for the module | MSc. Nguyen Manh Truong Giang |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Problem lecture with a multimedia presentation |
| Workload (incl. contact hours, self-study hours) | 150 Hours  Contact hours: Lectures: 60 hours (in class)  Private study: 90 hours (self-study) |
| Credit points | 4 Credits (6 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | This course provides fundamental knowledge about Multi objective problems and algorithms related to this class of problems.   1. Knowledge: get familiar with basic concepts in the theory of multi-objective optimization problem model, concept of solution and corresponding algorithm. 2. Skills & competences: Establish multi-objective optimization models for practical problems. Describe multi-objective optimization solution structures. Appreciating multi-objective optimization methods. Solve bicriteria linear optimization problems. 3. Attitude: Attend all classroom sessions, and discussions outside of class time. |
| Content | This module includes the following topics:   1. Solution concepts and some properties of solutions 2. Duality 3. Multi-objective linear programming 4. Multi-objective programming |
| Examination forms | Midterm and final exam: written exams |
| Study and examination requirements | Class attendance: at least 70%.  Final score is greater or equal to 5.0/10.0 |
| Reading list | 1. Y. Sawaragi, H. Nakayama, and T. Tanino, Theory of Multiobjective Optimization, Elsevier, 1984. 2. D. T. Luc, Multiobjective Linear Programming, Springer, 2014. 3. S. Woifram, Multicriteria optimization in engineering and in the sciences, Springer Science & Business Media, 1988 |

#### 3. Game Theory - MTH10541

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| --- | --- |
| Module designation | Game Theory |
| Semester(s) in which the module is taught | 6th semester |
| Person responsible for the module | MSc. Nguyen Van Thuy |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Lecture |
| Workload (incl. contact hours, self-study hours) | 180 Hours  Contact hours: Lectures: 60 hours (in class)  Private study: 120 hours (self-study) |
| Credit points | 4 Credits (6 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | Introducing the basics of game theory |
| Content | This module includes the following topics:   1. Some basis definitions. 2. Minimax Theorem 3. 2-person zero-sum games 4. symmetric zero-sum game 5. Indeterminate games, countable strategies, convex-concave games. 6. Non-zero sum game |
| Examination forms | Midterm and final exam: written exams |
| Study and examination requirements | Class attendance: at least 70%.  Final score is greater or equal to 5.0/10.0 |
| Reading list | 1. G. Owen, Game Theory, Academic Press Inc, 1995. 2. Bazaraa Mokhtar S, Jarvis John J., Sherali Hanif D., Linear programming and network flows, Wiley, 1990. |

#### 4. Optimal Control – MTH10545

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| --- | --- |
| Module designation | Optimal Control |
| Semester(s) in which the module is taught | 7th semester |
| Person responsible for the module | MSc. Cao Nghi Thuc |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Lecture |
| Workload (incl. contact hours, self-study hours) | 180 Hours  Contact hours: Lectures: 60 hours (in class)  Private study: 120 hours (self-study) |
| Credit points | 4 Credits (6.0 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | This course provides fundamental knowledge on the Optimal control problem, Pontryagin’s maximum principle, Existence and continuity properties of optimal controls. |
| Content | This module includes the following topics:   1. Introduce the optimal control problem. 2. Conditions for the existence of solutions to the optimal control problem. 3. Pontryagin’s maximum principle to solve many kinds of the optimal control problem. |
| Examination forms | Midterm and final exam: written exams. |
| Study and examination requirements | Class attendance: at least 70%.  Overall grade: minimum 5.0/10.0. |
| Reading list | Main textbook:   1. Vũ Ngọc Phát, Nhập môn Lý thuyết điều khiển Toán học, NXB Đại học Quốc gia Hà Nội, 2001. 2. Johannes Jahn, Vector Optimization, Springer, 2004 |

# **3. Graduation works**

#### 1. Graduation Thesis – MTH10595

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| Module designation | Graduation Thesis |
| Semester(s) in which the module is taught | 8th semester |
| Person responsible for the module | Assigned lecturers of the Faculty of Mathematics and Computer Science, University of Science, VNU-HCM |
| Language | Vietnamese |
| Relation to curriculum | Compulsory |
| Teaching methods | Project, seminar |
| Workload (incl. contact hours, self-study hours) | Total workload: 300 hours  Contact hours: 30 hours  Private study including examination preparation, specified in hours: 270 hours |
| Credit points | 10 credits (20 ECTS) |
| Required and recommended prerequisites for joining the module | Successfully completed 96/131 Credits |
| Module objectives/intended learning outcomes | After completing the course, students will be able to:   1. Point out the research problems 2. Apply fundamental knowledge and theories to analyse the research problem; develop a research framework (model if applicable); and design a solution for the problem 3. Use appropriate techniques for solutions 4. Demonstrate the scientific contribution and practical relevance of the research carried out 5. Provide a consistent, well-structured Bachelor Thesis 6. Plan and manage learning process 7. Present and defend results of the thesis at the Students’ Bachelor Thesis conference. |
| Content | Various topics |
| Examination forms | Graduation report |
| Study and examination requirements | Final defense: 100% |
| Reading list | Diverse and depends on the supervisors |

#### 2. Internship – MTH10549

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| --- | --- |
| Module designation | Internship |
| Semester(s) in which the module is taught | 8th semester |
| Person responsible for the module | Assigned lecturers of the Faculty of Mathematics and Computer Science, University of Science, VNU-HCM |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Instructions, hands-on activities |
| Workload (incl. contact hours, self-study hours) | Total workload: 180 hours  Contact hours (lectures, exercises): 90 hours  Private study including examination preparation, specified in hours: 90 hours |
| Credit points | 4 Credits (6 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | After completing the course, students will be able to:  Apply knowledge, skills in mathematics/applied mathematics/computer science to practice with real-life problems in company, industry.  Self-orient in the desired professional field.  Understand the impact of mathematics and computer science in a global, economic, environmental, and societal context.  Conduct work responsibly in cooperation with others.  Write and present a report in adequate format. |
| Content | Attendance: Students should attend 100%. Attendance will be regulated and checked.  Individual Assignments: Tasks are assigned by the industrial company.  Internship: At a company in the field corresponding to the registered major. |
| Examination forms | Internship report, Oral presentation |
| Study and examination requirements | Internship certificate issued by the company: 50%  Written report and presentation graded by the faculty supervisor: 50% |
| Reading list | Depending on the assigned tasks and instructors. |

#### Surveys of Mathematics, Computer Science, and Specializations – MTH10617

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| Module designation | Surveys of Mathematics, Computer Science, and Specializations |
| Semester(s) in which the module is taught | 4th semester |
| Person responsible for the module | Assigned lecturers of the Faculty of Mathematics and Computer Science, University of Science, VNU-HCM |
| Language | Vietnamese |
| Relation to curriculum | Elective |
| Teaching methods | Lectures, group work |
| Workload (incl. contact hours, self-study hours) | Total workload: 90 hours  Contact hours (lectures, exercises): 30 hours  self-study: 60 hours |
| Credit points | 2 Credits (3 ECTS) |
| Required and recommended prerequisites for joining the module | None |
| Module objectives/intended learning outcomes | General Objective: The course aims to provide students with a broad understanding of mathematics, computer science, and related majors in the training program. This foundation helps students orient themselves and make informed decisions when selecting their major.  Specific Objectives / Course Learning Outcomes:   * Knowledge: Students will gain an overview of mathematics, computer science, and related majors, along with their applications and career opportunities. * Skills: Gaining a general understanding of a field. * Attitude and Diligence: Seriousness, diligence, and a scientific approach. |
| Content | The course consists of lectures and activities conducted by multiple instructors, providing an overview of mathematics and computer science, their history worldwide, and the current state in Vietnam. It also introduces various majors, including their focus, research scope, applications, and career opportunities. Students engage actively, provide feedback, and undergo assessments. |
| Examination forms | Written exams |
| Study and examination requirements | Tests – process score: 70%  Final exam: 30 % |
| Reading list | 1. Lịch sử Toán học, Nguyễn Phú Lộc, NXB Giáo Dục, 2008. 2. The History of the Development of Information Technology and its Organizational and Societal Impact. M.C. Mr, 2013. 3. Lecture notes. |