BACHELOR OF SCIENCE
NUCLEAR ENGINEERING
MODULE HANDBOOK

BAA00101 - Philosophy Marx-Lenin

Module designation	**Name: Marxist-Leninist Philosophy** **Code: BAA00101**
Semester(s) in which the module is taught	1st semester
Person responsible for the module	GIANG Thi Truc Mai
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, Discussion, Debate, Group activities
Workload (incl. contact hours, self-study hours)	Total workload: 135 Contact hours: lecture: 45 Private study: 90
Credit points	3 Credits/ 4.5 ECTS Credits
Requirements and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	**Knowledge:** The course equips students with the basic contents of the worldview and the Marxist-Leninist philosophical methodology. **Skill:** 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	- Introduction - Philosophy and its role in social life - Dialectical Materialism - Historical Materialism
Examination forms	- Group presentation: 15% - Midterm exam: 20% - Discussion: 15% - Final exam: 50%
Study and examination requirements	Minimum attendance at lectures is 80%
Reading list	1. Ministry of Education and Training (2012), Textbook of basic principles of Marxism-Leninism, National Political Publishing House of Vietnam. 2. Ministry of Education and Training (2019), Textbook of Marxist-Leninist Philosophy, National Political Publishing House of Vietnam.

BAA00102 - Marxist-Leninist Political Economic

Module designation	**Name: Marxist-Leninist Political Economic** **Code: BAA00102**
Semester(s) in which the module is taught	1st semester
Person responsible for the module	GIANG Thi Truc Mai
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, Discussion, Debate
Workload (incl. contact hours, self-study hours)	Total workload: 90 Contact hours: lecture: 30 Private study: 60
Credit points	2 Credits/ 3 ECTS Credits
Requirements and recommended prerequisites for joining the module	BAA00101 - Marxist-Leninist Philosophy
Module objectives/intended learning outcomes	**Knowledge:** Firstly, equip students with basic and core knowledge of Marxist-Leninist political economy in the context of economic development of the country and the world today. Ensure the basic, systematic, scientific, update 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 of non-theoretical colleges and universities. **Skill:** 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. **Attitudes:** Third, contribute to building the stance and ideology of Marxism-Leninism towards students.

Content	- Objects, research methods and functions of the Marxist-Leninist political economy - Commodities, markets and the role of market participants - Surplus value in a market economy - Competition and Monopoly in a Market Economy - Socialist-oriented market economy and economic interests in Vietnam - Vietnam's industrialization, modernization and international economic integration
Examination forms	- Group presentation: 15% - Midterm exam: 20% - Discussion: 15% - Final exam: 50%
Study and examination requirements	Minimum attendance at lectures is 80%
Reading list	1. Mac-Leninist political economy textbook for undergraduates who are not majoring in political economy.

BAA00103 - Scientific Socialism

Module designation	**Name: Scientific Socialism** **Code: BAA00103**
Semester(s) in which the module is taught	3rd semester
Person responsible for the module	GIANG Thi Truc Mai
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, Discussion, Debate
Workload (incl. contact hours, self-study hours)	Total workload: 90 Contact hours: lecture: 30 Private study: 60
Credit points	2 Credits/ 3 ECTS Credits
Requirements and recommended prerequisites for joining the module	BAA00101 - Marxist-Leninist Philosophy BAA00102 - Marxist–Leninist Political Economy
Module objectives/intended learning outcomes	**Knowledge:** The subject equips students with the basic contents of scientific socialism (one of the three components constituting Marxism-Leninism). **Skill:** 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	- Introduction - Introduction to Scientific Socialism - The historical mission of the working class - Socialism and the transition to socialism - Socialist democracy and the socialist state - Class social structure and class and class alliances in the transition to socialism - Ethnic and religious issues in the transition to socialism - The problem of the family during the transition to socialism
Examination forms	- Group Presentation: 15% - Midterm exam: 20% - Discussion: 15%

	- Final exam: 50%
Study and examination requirements	Minimum attendance at lectures is 80%
Reading list	1. Ministry of Education and Training (2019), Textbook of Scientific Socialism, National Political Publishing House of Vietnam. 2. Ministry of Education and Training (2012), The Basic Principles of Marxism-Leninism, National Political Publishing House of Vietnam

BAA00104 - History of Vietnamese Communist Party

Module designation	**Name: History of Vietnamese Communist Party** **Code: BAA00104**
Semester(s) in which the module is taught	3rd semester
Person responsible for the module	QUACH Thi Minh Trang
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, Discussion, Debate
Workload (incl. contact hours, self-study hours)	Total workload: 90 Contact hours: lecture: 30 Private study: 60
Credit points	2 Credits/ 3 ECTS Credits
Requirements and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	**Knowledge:** Students know the 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 defence during the country's transition to socialism. association, conducting the renovation work (1975-2018). **Attitudes:** Through historical events and experiences on the leadership of the Party, students know how to build a sense of respect for objective truths, raise pride and confidence in the Party's leadership. **Skill:** Students know how to scientific thinking methods on history, skills in choosing research materials, studying subjects and the ability to apply historical awareness to practical work, criticising misconceptions on the history of the Party.

Content	- Introduction - The Communist Party of Vietnam was born and led the struggle for power (1930-1945) (12 hours) - The Party led two resistance wars, completed national liberation and reunification (1945-1975) - The Party led the country in the transition to socialism and carried out the doi moi (1975-2018)
Examination forms	- Group Presentation: 15% - Midterm exam: 20% - Discussion: 15% - Final exam: 50%
Study and examination requirements	Minimum attendance at lectures is 80%
Reading list	1. Ministry of Education and Training (2012), Subject program of History of Vietnamese Communist Party.

BAA00003 - HoChiMinh's Ideology

Module designation	**Name: HoChiMinh's Ideology** **Code: BAA00003**
Semester(s) in which the module is taught	3rd semester
Person responsible for the module	PHAN Thi Cam Lai
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, Discussion, Debate
Workload (incl. contact hours, self-study hours)	Total workload: 90 Contact hours: lecture: 30 Private study: 60
Credit points	2 Credits/ 3 ECTS Credits
Requirements and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	**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. **Skills:** Helping students to think, analyze, evaluate, and creatively apply Ho Chi Minh's Thoughts to solve problems in real life, study and work. **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 defense of the country.

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	- Presentation: 15% - Midterm exam: 20% - Discussion: 15% - End semester exam: 50%
Study and examination requirements	Minimum attendance at lectures is 80%
Reading list	1. Ministry of Education and Training (2019), Textbook of Ho Chi Minh Ideological, National Political Publishing House. 2. Faculty of Politics and Administration - VNU-HCM, Study Guide for Ho Chi Minh Ideological.

BAA00004 - Introduction to Vietnamese Law System

Module designation	**Name: Introduction to Vietnamese Law System** **Code: BAA00004**
Semester(s) in which the module is taught	2nd semester
Person responsible for the module	TRAN Xuan Thien An
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, Discussion, Debate
Workload (incl. contact hours, self-study hours)	Total workload: 135 Contact hours: lecture: 45 Private study: 90
Credit points	3 Credits/ 4.5 ECTS Credits
Requirements and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	By the end of the course, students will be able to 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 the law, the right behavior orientation in life. Students who complete this module could be achieved the following: - **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; - **Skills:** Analyzing legal regulations; Lookup legal documents; Working group. - **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	- Progress Test: 10% - Discussion, exercise, practice: 10% - Attendance: 10% - Mid term exam: 20% - Final exam: 50%
Study and examination requirements	Minimum attendance at lectures is 80%
Reading list	1. Ho Chi Minh City University of Law (2014), Textbook of General Law. 2. Hanoi University of Law (2013), Textbook of Theory of State and Law.

BAA00005 - General Economics

Module designation	**Name: General Economics** **Code: BAA00005**
Semester(s) in which the module is taught	3rd semester
Person responsible for the module	LE Nhan My
Language	Vietnamese
Relation to curriculum	Elective
Teaching methods	Lecture, Discussion, Debate
Workload (incl. contact hours, self-study hours)	Total workload: 90 Contact hours: lecture: 30 Private study: 60
Credit points	2 Credits/ 3 ECTS Credits
Requirements and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	**Knowledge:** Grasp the basic content of Microeconomics - a part of economics: - Understand the theory of economic choice, the influence of the law of scarcity, and economic models on economic choice. - Understand the theory of supply and demand. - Understand the theory of consumer behavior. - Understand the theory of producer behavior. - Understand the theory of competition and monopoly. - Understand the theory of factor markets. - Understand the theory of the role of government. - Understand the analysis of the influence of factors on the balance of the market. **Skills:** - 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. - Ability to apply the knowledge learned in the study of macroeconomics, development economics, and several other economic subjects.

	- 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. - Develop reasoning and public speaking skills. **Attitude:** 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. **Other Objectives**: Through presentations and problem-solving. - Forming and developing collaboration and teamwork skills: - Develop skills of creative thinking, discovery, and discovery; - Cultivate and develop assessment and self-assessment capacity; - 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.
Examination forms	- Exercise: 20% - Midterm exam: 20% - Final exam: 60%
Study and examination requirements	Minimum attendance at lectures is 80%
Reading list	1. Mankiw, N.G. (2003), Principles of economics (2nd edition), NewYork: Worth Publisher. 2. Duong Tin Diep (2001), Macroeconomics, Statistics Publishing House.

BAA00006 - General Psychology

Module designation	**Name: General Psychology** **Code: BAA00006**
Semester(s) in which the module is taught	3rd semester
Person responsible for the module	TRAN Huong Thao
Language	Vietnamese
Relation to curriculum	Elective
Teaching methods	Lecture, Discussion, Debate
Workload (incl. contact hours, self-study hours)	Total workload: 90 Contact hours: lecture: 30 Private study: 60
Credit points	2 Credits/ 3 ECTS Credits
Requirements and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	**Knowledge:** - Understand the system of basic concepts of psychological science and research methods in psychology. - Understand the origin, formation and development of psychology and consciousness. - Understand the nature of human psychological processes: perception; emotion - affection; act. - Identify human psychological states. - Understand the psychological attributes that make up the personality structure. Understand the factors affecting the formation and development of personality. **Skills:** - Developing the capacity to study documents: Analyze, synthesize, compare, and generalize. - Form and develop the ability to identify psychological phenomena and apply learned knowledge to solve practical problems. - Consulting and consulting skills. **Attitude:** - Cultivate a passion for learning and studying subjects.

	- Forming a sense of initiative and positivity in self-study. - Form the right motivation in learning. - Raise a sense of responsibility for group activities. **Other goals:** - Forming personality qualities in accordance with the requirements of the integration period. - Forming communication and behavioral skills in the community. - Forming a modern and scientific way of living and working. - Forming and developing the ability to think creatively, independently and critically. - Skill formation: Reasoning skills; Public speaking skills; - Form and develop teamwork skills.
Content	The course of general psychology helps 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.
Examination forms	- Individual exercises: 15% - Group exercises: 15% - Mid term exam: 20% - Final exam: 50%
Study and examination requirements	Minimum attendance at lectures is 80%
Reading list	1. Dang Thanh Nga (2006), General psychology textbook, People's Public Security Publishing House. 2. Nguyen Quang Uan (2005), General psychology textbook, Hanoi University of Education Publishing House.

BAA00007 - Creative Methodology

Module designation	**Name: Creative Methodology** **Code: BAA00007**
Semester(s) in which the module is taught	3rd semester
Person responsible for the module	VUONG Huynh Minh Triet
Language	Vietnamese
Relation to curriculum	Elective
Teaching methods	Lecture, Discussion, Debate
Workload (incl. contact hours, self-study hours)	Total workload: 90 Contact hours: lecture: 30 Private study: 60
Credit points	2 Credits/ 3 ECTS Credits
Requirements and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	**Knowledge:** - Provide a system of ways of looking at things - Increase observation, curiosity, creativity - Analyze and logically explain existing creative solutions - Increase the agility of absorbing and assessing the value of information - See the unified similarity between seemingly very different systems - Overcoming psychological inertia - Helps to discover available reserves in the system, especially free and easy to use heavenly reserves - Give and choose an appropriate approach to solve the problem - Play out ideas for improving a given system - Forecasting the development trend of a given system in the future **Skill:** - Help detect, place and select problems to be solved - Used to practice developing creative imagination - Used to improve yourself, build your style, think and

	work scientifically and creatively - Contributing to building system-dialectical thinking
Content	- Introduction - Natural methods of problem-solving and decision making - Some scientific and technical knowledge is the basis of the subject - Some basic creative tricks - Methods of activating creative thinking - Rules of system development
Examination forms	- Exercise: 20% - Mid term exam: 30% - Final exam: 50%
Study and examination requirements	Minimum attendance at lectures is 80%
Reading list	1. Phan Dung (2010), Introduction: Methodology of Creativity and Innovation, Youth Publishing House. 2. Phan Dung (2010), The world inside the creative person, Youth Publishing House. 3. Phan Dung (2000), Logical, Dialectical and Systematic Thinking, Youth Publishing House.

MTH00003 - Integral Calculus 1B

Module designation	**Name: Integral Calculus 1B** **Code: MTH00003**
Semester(s) in which the module is taught	1st semester
Person responsible for the module	NGUYEN Van Thuy
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, Discussion, Debate, Exercise
Workload (incl. contact hours, self-study hours)	Total workload: 135 Contact hours: lecture: 45 Private study: 90
Credit points	3 Credits/ 4.5 ECTS Credits
Requirements and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	Introduction to Calculus, with two major contents of differential and integral calculus. - **Knowledge:** visual, quantitative, conceptual understanding of essential definitions, theorems, and properties in calculus - **Skills:** understanding of concepts, ability of using calculus in practical problems, ability to solve calculus problems, ability to use computer computation softwares - **Attitude:** diligence
Content	The course provides basic knowledge of calculus for non-majors, including IT, physics, electronics and telecommunications, material science, oceanology, meteorology and hydrology, ..., helping students to acquire necessary background for professional study. Content includes real numbers, sequences and series of numbers, continuity, convergence, derivative, Riemannian integral of functions of one real variable.
Examination forms	- Exercise: 25% - Midterm exam: 25% - Final exam: 50%
Study and examination	Minimum attendance at lectures is 80%

requirements	
Reading list	1. J. Stewart (2012), Calculus, Brooks/Cole Cenage Learning. 2. Duong Minh Duc (2006), Textbook of Calculus 1, Ho Chi Minh City Statistics Publishing House. 3. K.A. Stroud and D.J. Booth (2001), Advanced Engineering Mathematics, Palgrave Macmillan.

MTH00004 - Integral Calculus 2B

Module designation	**Name: Integral calculus 2B** **Code: MTH00004**
Semester(s) in which the module is taught	2nd semester
Person responsible for the module	NGUYEN Thi Hoai Thuong
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, Discussion, Debate
Workload (incl. contact hours, self-study hours)	Total workload: 135 Contact hours: lecture: 45 Private study: 90
Credit points	3 Credits/ 4.5 ECTS Credits
Requirements and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	Introduction to Calculus, with two major contents of differential and integral calculus of functions of several variables. - **Knowledge:** visual, quantitative, conceptual understanding of essential definitions, theorems, and properties in calculus - **Skills:** understanding of concepts, ability of using calculus in practical problems, ability to solve calculus problems, ability to use computer computation softwares - **Attitude:** diligence, ask questions
Content	The course provides basic knowledge of calculus for non-majors, including IT, physics, electronics and telecommunications, material science, oceanology, meteorology and hydrology, ... , helping students to acquire necessary background for professional study. Content includes: The set of R^n, functions of several real variables, continuity, partial derivatives, extrema, multiple integrals, line integrals, Green theorem, surface integrals, Stokes and Gauss–Ostrogradski theorem, differential equations.
Examination forms	- Exercise: 25% - Midterm exam: 25%

	- Final exam: 50%
Study and examination requirements	Minimum attendance at lectures is 80%
Reading list	1. J. Stewart (2012), Calculus, Brooks/Cole Cenage Learning. 2. Duong Minh Duc (2006), Textbook of Calculus 1, Ho Chi Minh City Statistics Publishing House. 3. K.A. Stroud and D.J. Booth (2001), Advanced Engineering Mathematics, Palgrave Macmillan.

MTH00081 - Practice for Integral Calculus 1B

Module designation	**Name: Practice for Integral Calculus 1B** **Code: MTH00081**
Semester(s) in which the module is taught	1st semester
Person responsible for the module	NGUYEN Van Thuy
Language	Vietnamese
Relation to curriculum	Elective
Teaching methods	Lecture, Practice
Workload (incl. contact hours, self-study hours)	Total workload: 60 Contact hours: practice: 30 Private study: 30
Credit points	1 Credits/ 2 ECTS Credits
Requirements and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	Students are guided through exercises on differential calculus and integral calculus of functions of one variable, in order to understand and apply these concepts. **Knowledge**: Students practice calculating problems to understand and apply definitions, theorems and properties in calculus. **Skills:** understand and do exercises in applied calculus in practical problems, solve calculus problems, know how to use calculation software. **Attitude and Diligence**: Students need to fully participate in class hours, be able to ask questions they don't understand, and answer questions and assignments from lecturers.
Content	The subject plays the role of providing basic knowledge of differential mathematics for the fields of Information Technology, Electronics and Telecommunications, Physics, Oceanology, Meteorology and Hydrology, Materials Science to help students have a background Math foundation for specialized subjects. Knowledge will equip students: Sets of real numbers, Sequences and series of real numbers, Continuity,

	Limits, Derivatives and Reimann integrals of one-variable real functions, Differential equations, Matlab applications for calculation calculus.
Examination forms	- Attendance: 10% - Assignment: 30% - Final exam: 60%
Study and examination requirements	Minimum attendance at lectures is 80%
Reading list	1. J. Stewart (2012), Calculus, Brooks/Cole Cenage Learning. 2. Duong Minh Duc (2006), Textbook of Calculus 1, Ho Chi Minh City Statistics Publishing House. 3. K.A. Stroud and D.J. Booth (2001), Advanced Engineering Mathematics, Palgrave Macmillan.

MTH00030 - Linear Algebra

Module designation	**Name: Linear Algebra** **Code: MTH00030**
Semester(s) in which the module is taught	2nd semester
Person responsible for the module	NGUYEN Kim Ngoc
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, Discussion, Debate
Workload (incl. contact hours, self-study hours)	Total workload: 135 Contact hours: lecture: 45 Private study: 90
Credit points	3 Credits/ 4.5 ECTS Credits
Requirements and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	Introduction to higher mathematics. **- Knowledge:** solid grasp of knowledge on matrices on number fields and applications to solving systems of linear equations; determinants and applications; vector spaces and linear maps. **- Skills:** computation on matrices; solving systems of linear equations; computing coordinates of vectors in a linear basis; change of coordinates following change of bases; presentation of linear operators by matrices; computing images and kernels of linear operators; using MAPLE computation software. **- Attitude:** diligence, participating in discussions
Content	The course leads first year students to higher mathematics. Aside from fundamental knowledge for all students, the course lays foundation for later study for all majors.
Examination forms	- Assignment: 10% - Midterm exam: 20% - Final exam: 70%
Study and examination requirements	Minimum attendance at lectures is 80%
Reading list	1. Bui Xuan Hai, Tran Ngoc Hoi, Trinh Thanh Deo, Le Van Luyen (2009), Linear Algebra and Its Applications, Volume 1, VNUHCM Publishing House. 2. Ngo Viet Trung (2001), Textbook of Linear Algebra, VNUHCM Publishing House.

MTH00040 - Probability Statistics

Module designation	**Name: Probability Statistics** **Code: MTH00040**
Semester(s) in which the module is taught	3rd semester
Person responsible for the module	NGUYEN Thi Hien
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, Discussion, Debate
Workload (incl. contact hours, self-study hours)	Total workload: 135 Contact hours: lecture: 45 Private study: 90
Credit points	3 Credits/ 4.5 ECTS Credits
Requirements and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	The course provides basic knowledge of the theory of probability and mathematical statistics. The theory of probability studies random phenomena, while the theory of mathematical statistics proposes general models and statistical decisions. **- Knowledge:** the course provides the most basic knowledge and notions of probability and statistics to be background knowledge for later courses. **- Skills:** employs probability and statistics to solve some real-world problems related to analysis and presentation of data. **- Attitude:** the course helps students acquire initial knowledge of probability and statistics, and recognition of the role of probability and statistics in science and in life, from which an enthusiasm for science can be formed, then a serious and proactive attitude in study.
Content	- Combinatorics - Probability Basics - Random Variables - Descriptive Statistics - Hypothesis testing

	- Regression and correlation
Examination forms	- Attendance: 10% - Exercise: 10% - Midterm exam: 20% - Final exam: 60%
Study and examination requirements	Minimum attendance at lectures is 80%
Reading list	1. Nguyen Thi Mong Ngoc (2018), Probability Statistics, VNUHCM Publishing House. 2. Dang Duc Trong (2016), Statistical theory, VNUHCM Publishing House.

CHE00001 - General Chemistry 1

Module designation	**Name: General Chemistry 1** **Code: CHE00001**
Semester(s) in which the module is taught	2nd semester
Person responsible for the module	DOAN Le Hoang Tan
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, Discussion, Debate
Workload (incl. contact hours, self-study hours)	Total workload: 150 Contact hours: lecture: 30, execise: 30 Private study: 90
Credit points	3 Credits/ 5 ECTS Credits
Requirements and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	**Knowledge:** Describe the structure of atoms and molecules. Explain periodic changes in some properties of chemical elements. Identify and distinguish basic types of chemical bonds. Identify and explain the relationship between the fundamental forces of interaction in matter and the physical properties of matter
Content	The course 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 matter, and the influence of chemical elements. their influence on the properties of matter in the solid, liquid, and gaseous states.
Examination forms	- Attendance: 5% - Exercises: 10% - Mid term exam: 25% - Final exam: 60%
Study and examination requirements	Minimum attendance at lectures is 80%
Reading list	1. Nguyen Dinh Chi (2007), General chemistry, Education Publishing House. 2. Nguyen Dinh Soa (2000), General chemistry, VNUHCM Publishing House. 3. Petrucci, R.H; Harwood, W.S; Herring, F.G (2002), General Chemistry (8th Ed), Prentice Hall.

PHY00001 - General Physics 1 (Mechanics and Thermodynamic)

Module designation	**Name: General Physics 1 (Mechanics and Thermodynamic)** **Code: PHY00001**
Semester(s) in which the module is taught	1st semester
Person responsible for the module	NGUYEN Duy Thong
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, Discussion, Debate, Group activities
Workload (incl. contact hours, self-study hours)	Total workload: 135 Contact hours: lecture: 45 Private study: 90
Credit points	3 Credits/ 4.5 ECTS Credits
Requirements 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 be achieved the following: **- 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. **- Skills:** Be able to work at individual level and group work. **- Competences:** Ability to apply mechanics and thermodynamics knowledge to analyze physical situations. **- Attitude:** Honest
Content	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 first law of thermodynamics
Examination forms	1. Assignment = 10% 2. Quizzes and Projects (teamwork) = 10% 3. Midterm exam = 30% 4. Final exam = 50%
Study and examination requirements	Minimum attendance at lectures is 80%
Reading list	1. Nguyen Nhat Khanh (2005), Mechanics and thermodynamics lectures, VNUHCM Publishing House, Vietnam. 2. Nguyen Thanh Van (2013), General Physics 1, VNUHCM Publishing House, Vietnam. 3. Raymond A. Serway, John W. Jewett, Sr, (2014), Physics for Scientists and Engineers with Modern Physics, Brooks/Cole Publishing Company, USA. 4. Alan Giambattista, Betty McCarthy Richardson, Robert C. Richardson, (2010), Physics, McGrawHill Companies, Inc, USA.

PHY00002 - General Physics 2 (Electromagnetism - Optics)

Module designation	**Name: General Physics 2 (Electromagnetism - Optics)** **Code: PHY00002**
Semester(s) in which the module is taught	2nd semester
Person responsible for the module	DO Duc Cuong
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, Discussion, Debate, Exercise
Workload (incl. contact hours, self-study hours)	Total workload: 135 Contact hours: lecture: 45 Private study: 90
Credit points	3 Credits/ 4.5 ECTS Credits
Requirements and recommended prerequisites for joining the module	Calculus 1B, 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 be achieved the following: **- Knowledge:** Be able to understand and apply knowledge of electromagnetism and optics in science and life. **- Skills:** Be able to work at individual level and teamwork. **- Competences:** Ability to apply electromagnetism and optics knowledge to analyze physical situations. **- Attitude:** Honesty and diligence
Content	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	1. Assignment: 10% 2. Projects: teamwork, oral presentation: 10% 3. Midterm exam: 30% 4. Final exam: 50%
Study and examination requirements	Minimum attendance at lectures is 80%
Reading list	1. Nguyen Thanh Van (2015), General Physics 2, VNUHCM Publishing House, Vietnam. 2. Le Vu Tuan Hung (2015), Optics, VNUHCM 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.

PHY00003 - General Physics 3 (Mechanics – Thermodynamics)

Module designation	**General Physics 3 (Mechanics – Thermodynamics)**
Semester(s) in which the module is taught	2nd semester
Person responsible for the module	Dr. PHAN Le Hoang Sang
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	*Lecture, lesson,* discussion, debate.
Workload	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	Calculus 1B, General physics 1
Module objectives/intended learning outcomes	This module provides students with basic knowledge of relativistic mechanics, fluid mechanics, fundamental characteristics of real gases, liquid, transport phenomena of gases, and thermodynamic potentials. After completing this module, students can achieve the following: *- Knowledge: Be able to understand and apply knowledge of advanced mechanics and thermodynamics in science activities.* *- Skills: Be able to work in individual, group work, and problem solving.* *- Competences: Ability to apply advanced mechanics and thermodynamics knowledge to analyze physical situations.* *- Attitude: Honesty and diligence*
Content	This module includes the following topics: 1. Relativistic mechanics 2. Fluid mechanics 3. Real gases 4. Transport phenomena of gases 5. Liquid 6. Thermodynamic potentials
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)

	● Homework at class and home (20%), ● Mid semester exam (30%), ● End semester exam (50%)
Reading list	Main books: 1. Nguyen Nhat Khanh, Chau Van Tao (2007) Mechanics. VNUHCM Publishing House, Vietnam. 2. Nguyen Nhat Khanh, Chau Van Tao (2012), Thermology and Thermodynamics, VNUHCM Publishing House, Vietnam. References: 1. Luong Duyen Binh (2003) General Physics. Education Publishing House, Vietnam. 2. David Halliday, Robert Resnick, Jearl Walker (2009), Fundamental of Physics, Education Publishing House, Vietnam.

PHY00004 - Modern Physics

Module designation	**Name: Modern Physics** **Code: PHY00004**
Semester(s) in which the module is taught	3rd semester
Person responsible for the module	Assoc. Prof. HUYNH Truc Phuong
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, discussion, debate
Workload	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	Calculus 1B, General physics 1, General physics 2
Module objectives/intended learning outcomes	This module provides students with fundamental knowledge of quantum optics, atomic and nuclear physics. Students who complete this module could be achieved the following: **- Knowledge:** Be able to understand quantum optics, atoms and nuclei in the discovery and study of matter. Be able to apply quantum optics, atoms and nuclei in science activities. **- Skills:** Be able to work in individual, group work, and problem solving. **- Competences:** Ability to apply modern physics knowledge to analyze new physical situations. **- Attitude:** Honesty and diligence
Content	This module includes the following topics: 1. Wave-particle duality of light 2. Waves of matter 3. Fundamentals of quantum mechanics 4. Fundamentals of atomic physics 5. Fundamentals of nuclear physics

Examination forms	Projects (Individual activities); 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:** 1. Huynh Truc Phuong, Truong Thi Hong Loan, Chau Van Tao (2015). Quantum – Atomic - Nuclear. For internal circulation only, University of Science, VNUHCM, Vietnam. **References:** 1. Raymond A. Serway, John W. Jewett, Sr (2014). Physics for Scientists and Engineers with Modern Physics. Ninth Edition. BROOK/COLE, USA. 2. Alan Giambattista, Betty McCarthy Richardson, Robert C. Richardson (2010). Physics. Second Edition. McGrawHill, USA.

PHY00012 - Introduction to Nuclear Engineering

Module designation	Introduction to Nuclear Engineering
Semester(s) in which the module is taught	1st Semester
Person responsible for the module	Assoc. Prof. TRAN Thien Thanh
Language	Vietnamese
Relation to curriculum	Compulsory course
Teaching methods	Lectures, practical sessions, and guided exercises
Workload (incl. contact hours, self-study hours)	165 hours Contact hours: Lectures: 15 hours *(in class)* Practice: 60 hours *(in class)* Private study: 90 hours *(self-study)*
Credit points	3 Credits / 5.5 ECTS
Required and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	Upon successful completion of this module, students will be able to: Knowledge: - Understand fundamental concepts of nuclear engineering and its relationship to other scientific disciplines. - Identify the historical development, scope of application, and modern issues in nuclear engineering. - Recognize career opportunities and the societal role of nuclear engineering. Skills: - Develop communication, teamwork, and basic presentation skills in academic and project settings. - Apply SWOT analysis for personal academic development and career planning. Competences: - Understand current research directions in nuclear engineering.

	- Demonstrate ethical responsibility and professional behavior in nuclear-related fields. Attitude and Ethics: - Exhibit a professional attitude toward learning and collaboration - Demonstrate ethical responsibility in working environments related to nuclear engineering.
Content	This module introduces nuclear engineering and its broader applications, equipping students with foundational knowledge and practical skills.. This module covers the following topics: 1. Introduction to Nuclear Engineering: • Overview of the discipline and its relationship to other fields. • Historical development of nuclear engineering. 2. Applications of Nuclear Engineering: • Interdisciplinary connections with natural sciences. • Applications in healthcare, research, and industry. 3. Fundamental Skills Development: • Communication and teamwork in academic and project settings. • Poster and oral presentation techniques. 4. Research Directions in Nuclear Engineering: • Major research areas in nuclear engineering. • Current trends and their impact on society. 5. SWOT Analysis and Career Planning: • Introduction to SWOT analysis. • Application of SWOT for personal academic and career growth. 6. Environmental and Societal Impact of Nuclear Technologies: • Effects of nuclear technologies on the environment and human health. • Ethical considerations in nuclear engineering.

Examination forms	• Midterm Assessment: Seminar presentation or written assignment. • Final Assessment: Poster and oral presentation.
Study and examination requirements	• Minimum Attendance Requirement: 80% attendance for lectures and practical sessions. • Final Score Requirement: A score of 5.0/10.0 or higher is required to pass the module.
Reading list	Main Books and Resources: 1. John R. Lamarsh (2001), *Introduction to Nuclear Engineering*, Prentice Hall. 2. James E. Martin (2006), *Physics for Radiation Protection*, Wiley-VCH. 3. Đào Văn Phúc (2005), *Lịch sử Vật Lý*, NXB Giáo dục. Supplementary Resources: • Lecture notes and slides provided by the instructor. • Online resources and research publications in nuclear engineering.

PHY00081 - Lab Work on General Physics

Module designation	**Name: Lab Work on General Physics** **Code: PHY00081**
Semester(s) in which the module is taught	2nd semester
Person responsible for the module	HUA Thi Hoang Yen
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, Discussion, Exercise, Practice
Workload (incl. contact hours, self-study hours)	Total workload: 120 Contact hours: practice: 60 Private study: 60
Credit points	2 Credits/ 4 ECTS Credits
Requirements 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 be achieved the following: **- 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. **- Skills:** Be able to work in individual, group work, self-study, and problem solving. **- Competences:** Be able to analyze, process and write experimental data reports. **- Attitude:** be honest, responsible, respect for colleagues.
Content	1. Density of liquid and solids. The private mass of the metals 2. Viscosity. Viscosity is dependence of different

	temperature 3. Reversible pendulum. The Mathematical pendulum 4. Heat of function for ice. Determination of heat 5. Mechanical equivalent of heat. The heat capacity of metals 6. Wheatstone Bridge. Resistor is dependence of different temperature 7. Voltmeter and Amperemeter DC. Voltmeter and Amperemeter AC 8. AC circuit. RLC circuit 9. Diode characteristics 10. Transistor characteristics 11. Microscope. To measure diameter of other small object 12. Refraction by a prism. Dispersion and resolving power of the prisms 13. Polarization of light Rotatory power
Examination forms	1. Homework assignment (Practice report): 20% 2. Final test: 80%
Study and examination requirements	Minimum attendance at lectures is 80%
Reading list	1. Dang Van Liet, Do Dinh Luyen, Nguyen Van Nghia, Tran Thi Kim Phuong (2008), General Physics Experiments, University of Science – VNUHCM.

GEO00002 - Earth Science

Module designation	**Name: Earth Science** **Code: GEO0002**
Semester(s) in which the module is taught	3rd semester
Person responsible for the module	
Language	Vietnamese
Relation to curriculum	Elective
Teaching methods	Lecture, lesson, discussion, debate
Workload	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	The subject introduces general knowledge about the earth related to the earth's spheres, the earth's operating position in space, the composition and structure of the atmosphere, wind, weather, climate … Students who complete this module could be achieved the following: **- Knowledge:** Be able to understand the earth's natural environment **- Skills:** Be able to work in individual, group work, and problem solving. **- Competences:** Ability to apply earrth science knowledge to explain natural phenomena. **- Attitude:** Honesty and diligence
Content	This module includes the following topics: 1. Earth in space 2. Physical and chemical properties of the earth 3. Atmospheric composition and structure 4. Wind and weather 5. Climate change 6. Sweetness of the earth 7. Seas and oceans

	8. Mineral 9. Earthquakes and volcanoes 10. Earth history
Examination forms	Mid-term: Written exam and Final exam: multiple choice
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:** 1. Earth Science, DANIELSON, E.W., DENECKE, E.J.Jr"l986 2. Foundations of Eurth Science, Lutgens Frederick K. Tarbtrck Edlvard J. 1991

ENV00001 - General Environment

Module designation	**Name: General Environment** **Code: ENV00001**
Semester(s) in which the module is taught	3rd semester
Person responsible for the module	LE Ngoc Tuan
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, Discussion, Debate, Group activities
Workload (incl. contact hours, self-study hours)	Total workload: 90 Contact hours: lecture: 30 Private study: 60
Credit points	2 Credits/ 3 ECTS
Requirements and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	Students are able to: **- Knowledge:** Understand the basic concepts of environment and natural resources, environment issues in the world and Vietnam. Have positive attitude about the interaction between people and the environment. **- Competences:** to improve personal skills and attitudes and communication skills;
Content	- Introduction on environmental concepts - Natural resources - Human impact on the environment - Sustainable development - Environmental management and Environmental Education
Examination forms	- Team works: 20% - Mid-term exam: 30% - Final exam: 50%
Study and examination requirements	Students must attend at least 80% of the lectures to sit for the final test
Reading list	Le Van Khoa (2004), Environmental Science, The Education Publisher.

CSC00003 - Computer Science 1

Module designation	**Name: Computer Science 1** **Code: CSC00003**
Semester(s) in which the module is taught	1st semester
Person responsible for the module	
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, Discussion, Debate, Practice
Workload (incl. contact hours, self-study hours)	Total workload: 165 Contact hours: lecture: 15, practice: 60 Private study: 90
Credit points	3 Credits/ 5.5 ECTS Credits
Requirements and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	**Knowledge:** Students have the general knowledge of computers as well as the fundamentals of working with the Windows operating system and Internet services. **Skill:** Students have the ability to working with common software on computers. Students have the ability to prepare text, presentation and data calculation with calculators. Students can build electronic information pages.
Content	- Basic understanding of information technology - Basic computer usage - Basic Microsoft Word - Basic Microsoft PowerPoint - Basic Microsoft Excel - Internet usage - Web image processing - Web design with HTML & CSS3
Examination forms	- Attendance: 10% - Exercise: 10% - Midterm exam: 30% - Final exam: 50%

Study and examination requirements	Minimum attendance at lectures is 80% Full attendance in practical, on time.
Reading list	1. Microsoft Office MOS Document, IIG Vietnam. 2. IC3 Spark Document, IIG Vietnam.

BAA00011 - English 1

Module designation	**Name: English 1** **Code: BAA00011**
Semester(s) in which the module is taught	1st semester
Person responsible for the module	TRUONG Thi Huynh Nhu
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, Discussion, Debate, Role-plays
Workload (incl. contact hours, self-study hours)	Total workload: 150 Contact hours: lecture: 30, practice: 30 Private study: 90
Credit points	3 Credits/ 5 ECTS Credits
Requirements and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	**Knowledge:** - Student 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. - Student can understand and use grammar structures at the pre-intermediate level such as basic tenses and other related matters. - Student 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. **Skill:** Student will be able to pronounce single words, word clusters and sentences, describe a given picture, and build basic communications in daily life. Student will be able to comprehend 300-500 word passage of familiar topics, and gain more knowledge of different cultures around the world. Student can write essays about familiar topics related to daily life, learning activities, entertainment, events …

Content	- Leisure and lifestyle - Important firsts - At rest, at work - Special occasions - Appearance - Time off - Ambitious dreams - Countries and cultures
Examination forms	- Exercise, Activities: 25% - Mid term exam: 25% - Final exam: 50%
Study and examination requirements	Minimum attendance at lectures is 80%
Reading list	1. Sarah Cunningham, Peter Moor, Jane Comyns Carr (2005), New Cutting Edge, pre-intermediate: student's book, Harlow: Pearson Education. 2. Sarah Cunningham, Peter Moor, Jane Comyns Carr (2005), New Cutting Edge, pre-intermediate: workbook, Harlow: Pearson Education.

BAA00012 - English 2

Module designation	**Name: English 2** **Code: BAA00012**
Semester(s) in which the module is taught	2nd semester
Person responsible for the module	TRUONG Thi Tuyet Hanh
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, Discussion, Debate, Role-plays
Workload (incl. contact hours, self-study hours)	Total workload: 150 Contact hours: lecture: 30, practice: 30 Private study: 90
Credit points	3 Credits/ 5 ECTS Credits
Requirements and recommended prerequisites for joining the module	BAA00011 - English 1
Module objectives/intended learning outcomes	**Knowledge:** - Student 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. - Student 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. - Student will be able to choose the correct response for the questions and understand dialogues and short monologues. **Skill:** Student 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. Student will be able to comprehend 500-700 word passages of familiar topics, and gain more knowledge of different cultures around the world. Student can write appropriate responses to written requests or complaints in business and social contexts, applying theories into real life practice.

Content	- Old and new - Take care! - The best thing in life - Got to have it! - Choosing the right person - Money, Money, Money - Imagine
Examination forms	- Exercise, Activities: 25% - Mid term exam: 25% - Final exam: 50%
Study and examination requirements	Minimum attendance at lectures is 80%
Reading list	1. Sarah Cunningham, Peter Moor, Jane Comyns Carr (2005), New Cutting Edge, pre-intermediate: student's book, Harlow: Pearson Education. 2. Sarah Cunningham, Peter Moor, Jane Comyns Carr (2005), New Cutting Edge, pre-intermediate: workbook, Harlow: Pearson Education.

BAA00013 - English 3

Module designation	**Name: English 3** **Code: BAA00013**
Semester(s) in which the module is taught	3rd semester
Person responsible for the module	LE Tran Thuc
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, Discussion, Debate, Role-plays
Workload (incl. contact hours, self-study hours)	Total workload: 150 Contact hours: lecture: 30, practice: 30 Private study: 90
Credit points	3 Credits/ 4.5 ECTS Credits
Requirements and recommended prerequisites for joining the module	BAA00012 - English 2
Module objectives/intended learning outcomes	**Knowledge:** - Student 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. **Skill:** Student can understand and use new language in a natural, communicative way. Student will be able to present their opinions about some social and cultural issues and understand dialogues and talks. Student will be able to comprehend 500-700 word passages of familiar topics, and gain more knowledge of different cultures around the world. Student can write paragraphs about familiar topics related to daily life, learning activities, entertainment, events, etc.
Content	- All about you - Memory - Around the world - Life stories - Success - In the media

Examination forms	- Exercise, Activities: 25% - Mid term exam: 25% - Final exam: 50%
Study and examination requirements	Minimum attendance at lectures is 80%
Reading list	1. Sarah Cunningham, Peter Moor, Jane Comyns Carr (2005), New Cutting Edge, pre-intermediate: student's book, Harlow: Pearson Education. 2. Sarah Cunningham, Peter Moor, Jane Comyns Carr (2005), New Cutting Edge, pre-intermediate: workbook, Harlow: Pearson Education.

BAA00014 - English 4

Module designation	**Name: English 4** **Code: BAA00014**
Semester(s) in which the module is taught	4th semester
Person responsible for the module	NGUYEN Thi Bich Phuong
Language	English
Relation to curriculum	Compulsory
Teaching methods	Discussion, Debate, Role-plays
Workload (incl. contact hours, self-study hours)	Total workload: 150 Contact hours: lecture: 30, practice: 30 Private study: 90
Credit points	3 Credits/ 5 ECTS Credits
Requirements and recommended prerequisites for joining the module	BAA00013 - English 3
Module objectives/intended learning outcomes	**Knowledge anh skills:** - Student can understand and use the language needed in more complex real-life situations in a natural, communicative way. - Student will be able to express their own ideas in interviews, mini-talks, problem-solving and story¬telling. - Student will be able to comprehend 700-1000 word passages of up-to-date topics of international interest, and learn more about the world and other cultures. - Student can write essays about familiar topics related to daily life, learning activities, entertainment, events, etc.
Content	- Socialising - Things you can't live without - Future society - An amazing story - Rules and freedom - Dilemmas
Examination forms	- Exercise, Activities: 25% - Mid term exam: 25%

	- Final exam: 50%
Study and examination requirements	Minimum attendance at lectures is 80%
Reading list	1. Sarah Cunningham, Peter Moor, Jane Comyns Carr (2005), New Cutting Edge, pre-intermediate: student's book, Harlow: Pearson Education. 2. Sarah Cunningham, Peter Moor, Jane Comyns Carr (2005), New Cutting Edge, pre-intermediate: workbook, Harlow: Pearson Education.

BAA00021 - Physical Education 1

Module designation	**Name: Physical Education 1** **Code: BAA00021**
Semester(s) in which the module is taught	1st semester
Person responsible for the module	CAO Hong Chau
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, Practice
Workload (incl. contact hours, self-study hours)	Total workload: 75 Contact hours: lecture: 15, practice: 30 Private study: 60
Credit points	2 Credits/ 3.5 ECTS Credits
Requirements and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	**Knowledge:** - Knowledge of injury prevention, hygiene in physical education and sports training - Understanding the role of physical education and sports training in human health **Skills:** - Basic practical skills and the ability to apply techniques and tactics in the training and competition of some sports - Knowledge of some rules, how to organize competitions, first aid skills and hygiene in physical education and sports training - Communication, teamwork and coordination skills **Competence and Attitude:** - Applying the knowledge of sports learned to practice every day - Applying the knowledge of sports learned to practice every day - Always have a sense of responsibility for learning, have a progressive spirit

Content	**General knowledge:** - Brief history of the development of physical education and sports - Effects of physical education and sports training on body development - The role of physical education and sports in comprehensive education - Injuries in physical education and sports and preventive measures - A brief history of the development and effects of exercises of a specific sport (football, volleyball, basketball, table tennis, tennis, badminton, martial arts, aerobics, swimming, chess) **Motor skills:** - Techniques for practicing a specific sport (football, volleyball, basketball, table tennis, tennis, badminton, martial arts, aerobics, swimming, chess) - Exercises to develop general and professional strength
Examination forms	- Attendance: 10% - Midterm exam: 30% - Final exam: 60%
Study and examination requirements	Minimum attendance at lectures is 80%
Reading list	1. Hoang Ha, Tran Nam Giao, Nguyen Thi Le Hang, Pham Kim Dien (2010), Textbook of Physical Education Volume 1. 2. Phan Thanh My, Nguyen Minh Man (2010), Textbook of Physical Education Volume 2. 2. Duong Van Hien, Nguyen Chi Cuong, Pham Cho, Cao Hong Chau, Nguyen Huu Quy (2010), Textbook of Physical Education Volume 3. 3. Luu Quang Hiep, Le Duc Chuong, Vu Chung Thuy, Le Huu Hung (2000), Sports medicine, Sports Publishing House.

BAA00022 - Physical Education 2

Module designation	**Name: Physical Education 2** **Code: BAA00022**
Semester(s) in which the module is taught	2nd semester
Person responsible for the module	NGUYEN Chi Cuong NGUYEN Minh Man
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, Practice
Workload (incl. contact hours, self-study hours)	Total workload: 75 Contact hours: lecture: 15, practice:30 Private study: 30
Credit points	2 Credits/ 3.5 ECTS Credits
Requirements and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	**Knowledge:** - Knowledge of injury prevention, hygiene in physical education and sports training - Understanding the role of physical education and sports training in human health **Skills:** - Basic practical skills and the ability to apply techniques and tactics in the training and competition of some sports - Knowledge of some rules, how to organize competitions, first aid skills and hygiene in physical education and sports training - Communication, teamwork and coordination skills **Competence and Attitude:** - Applying the knowledge of sports learned to practice every day - Applying the knowledge of sports learned to practice every day - Always have a sense of responsibility for learning, have a progressive spirit

Content	**General knowledge:** - Principles and methods of physical education and sports training - Rules of competition for a specific sport (football, volleyball, basketball, table tennis, tennis, badminton, martial arts, aerobics, swimming, chess) - A brief introduction to the tactics of a specific sport (football, volleyball, basketball, table tennis, tennis, badminton, martial arts, aerobics, swimming, chess) - Methods of organizing competitions and refereeing for a specific sport (football, volleyball, basketball, table tennis, tennis, badminton, martial arts, aerobics, swimming, chess) **Motor skills:** - Techniques for practicing a specific sport (football, volleyball, basketball, table tennis, tennis, badminton, martial arts, aerobics, swimming, chess) - Methods of organizing competitions and refereeing for a specific sport (football, volleyball, basketball, table tennis, tennis, badminton, martial arts, aerobics, swimming, chess) - Exercises to develop general and professional strength
Examination forms	- Attendance: 10% - Midterm exam: 30% - Final exam: 60%
Study and examination requirements	Minimum attendance at lectures is 80%
Reading list	1. Hoang ha, Tran Nam Giao, Nguyen Thi Le Hang, Pham Kim Dien (2010), Textbook of Physical Education Volume 1. 2. Phan Thanh My, Nguyen Minh Man (2010), Textbook of Physical Education Volume 2. 2. Duong Van Hien, Nguyen Chi Cuong, Pham Cho, Cao Hong Chau, Nguyen Huu Quy (2010), Textbook of Physical Education Volume 3. 3. Luu Quang Hiep, Le Duc Chuong, Vu Chung Thuy, Le Huu Hung (2000), Sports medicine, Sports Publishing House.

PHY10001 - Functions of a Complex Variable

Module designation	**Functions of a Complex Variable**
Semester(s) in which the module is taught	3rd semester
Person responsible for the module	MSc. Nguyen Thi Huyen Nga
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	*Lecture, lesson,* discussion, debate.
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/ 3ECTS
Recommended prerequisites	Calculus 1B
Module objectives/intended learning outcomes	This module provides the basics for solving a number of physics problems. These methods are concerned with complex integrals, complex series expansions and integral transformations as well as the theory of residues. Students who complete this module could be achieved the following: - *Knowledge: Be able to understand and apply knowledge of functions of a complex variable and Complex integrals.* - *Skills: Be able to work in individual, group work.* -*Competences: Using functions of a complex variable to solve real and complex integration problems and differential equations in Physics.* - *Attitude and Ethic: Honesty, diligence, and responsibility.*
Content	This module includes the following topics: 1. Complex numbers and their properties. 2. Functions of complex variable 3. Basic Complex Functions 4. Integration of functions of complex variable. 5. Residue theorems 6. Fourier transform and Laplace transform 7. Using complex variable functions to solve differential equations.
Examination forms	Homework and Individual project, Final test: written text

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: 1. W. Kaplan, Introduction to analytic functions, Addison Wesley Company Inc., 1966. References: 2. Nguyen Kim Dinh, Complex functions and applications (in Vietnamese), VNUHCM Publishing House, Vietnam, 2012. 3. A. David Wunsch, Complex Variables with applications, Pearson; 3rd edition, 2004. 4. Richard A. Silverman, Introductory complex analysis, Prentice-hall Inc. Englewood Cliffs N.J., 1967.

PHY10002 - Lab of Fundamental Physics

Module name:	**Lab of Fundamental Physics**
Semester(s) in which the module is taught	3rd semester
Person responsible for the module	Dr. NGUYEN Huynh Tuan Anh
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lab works, discussion, practice
Workload (incl. contact hours, self-study hours)	120 hours Contact hours: Lab works: 60 hours *(in class)* Private study: 60 hours *(self-study)*
Credit points	2 Credits / 4 ECTS
Required and recommended prerequisites for joining the module	Labwork on General Physics, General physics 1
Module objectives/intended learning outcomes	This module provides basic knowledge experiment of mechanics, acoustics, thermodynamics, electricity and magnetism, light and optics, modern physics. Students who complete this module could be achieved the following: - Knowledge: Be able to understand and apply knowledge of mechanics, acoustics, thermodynamics, electricity and magnetism, light and optics, modern physics in science and life. - Skills: Be able to work in individual, group work, self-study, lifelong learning, and problem solving. - Competences: Be able to design a higher experiment involving mechanics, acoustics, thermodynamics, electricity and magnetism, light and optics, modern physics. Have the capacity to learning in the next periods.
Content	This module includes the following topics: 1. Interference of light 2. Diffraction of light 3. Magnetic field of paired coils in Helmholtz arrangement 4. Planck's "quantum of action" from photoelectric effect (line separation by interference filters) 5. Two-electron spectra with the prism spectrometer 6. Polarization of light 7. Heat capacity of gas 8. Characteristic curves of a solar cell 9. Black Body Radiation: Determination of Stefan's Constant 10. Determining the Curie Temperature of Iron and Nickel

	11. Moment and angular momentum
Examination forms	Practice report, practice exam
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: 1. Nguyen Huynh Tuan Anh, General physics practice textbook 2 References: 1. Luong Duyen Binh, General Physics: volume I: Mechanics – Heat, Education Publishing House, 1995 2. Nguyen Thanh Van, General Physics: volume I: mechanics – heat, Ho Chi Minh City National University Publishing House, 2013. 3. Nguyen Thanh Van, Electromagnetic - Optical , Ho Chi Minh City National University Publishing House, 2015.

PHY10003 - Computational Mathematics

Module designation	**Computational Mathematics**
Semester(s) in which the module is taught	4th semester
Person responsible for the module	NGUYEN Chi Linh
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	*Lecture, lesson, project,* discussion, debate
Workload (incl. contact hours, self-study hours)	150 Hours Contact hours: Lectures: 30 hours *(in class)* Practice: 30 hours Private study: 90 hours *(self-study)*
Credit points	3 Credits / 5 ECTS
Required and recommended prerequisites for joining the module	Calculus 1, 2
Module objectives/intended learning outcomes	This course focus on describing the computational methods which students can applied in physics and engineering problems. Students who complete this module could be achieved the following: *- Knowledge: Be able to use the numerical methods for studying computational problems.* *- Skills: Be able to work and discuss in group.* *- Competences: Be able to set up a numerical program for solving engineering physics* *- Attitude and Ethics:Be able to become honest in studying to produce reliable result..*
Content	This module includes the following topics: 8. Number System and Errors in the Approximation 9. Solving Equation and number of equations 10. Interpolation 11. Numerical differentiation and integration 12. Linear Algebraic Equations and Eigenvalues 13. The least Squares and the Spline Interpolation 14. Differental Equations and Boundary Value Problems 15. Difference Method for Partial Differential Equations
Examination forms	Practice reports, practice exam
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: • V.L.Dang, Numerical analysis (2004), VNUHCM Publishing House, Vietnam References: • Steven C. Chapra Raymond P. Canale (2009), Published by McGraw-Hill

PHY10004 - Mathematical Methods for Physics

Module designation	**Mathematical Methods for Physics**
Semester(s) in which the module is taught	4th Semester
Person responsible for the module	Dr. NGUYEN Huu Nha
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, discussion, debate
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	Calculus 1B&2B, Linear Algebra, Functions of Complex Variables
Module objectives/intended learning outcomes	These lectures provide an introduction to Fourier Series. The emphasis is on showing how these are useful for solving the wave equation, the heat equation and Laplace's equation. Moreover, the course introduces the idea of Dirac delta function which is useful in Quantum Mechanics and Electrodynamics, and the calculus of variation which is the basis for Theoretical mechanics. The last one is how to solve second order ordinary differential equation by using the power series method and apply to some special functions such as Legendre function, Hermite function, Bessel function, Laguerre function. Detailed analysis will mostly be avoided. The lectures are aimed at second year undergraduates. • Skills/Competences/Attributes: Students will have opportunities to develop the skill(s)/competence(s)/ attribute(s) specified below: - Logical thinking, problem solving. - Communication. - Self-study, lifelong self-study. - Using specialized English terminology. - Responsibility, be honest; growth mindset; open-mindedness.
Content	1. Fourier series 2. Partial differential equations: the wave equation, the heat equation and Laplace's equation 3. Dirac delta function 4. Calculus of variation 5. Special functions: Legendre function, Hermite function, Bessel function, Laguerre function
Examination forms	Midterm test and Final test: written test
Study and examination	• Minimum attendance at lectures is 80% (according to ITB

requirements	regulation). Final score is evaluated based on assignment and presence (30%), mid semester exam (30%), and end semester exam (40%)) • Final score is greater or equal to 5.0/10.0.
Reading list	Main books: • La Thi Cang, Mathematical methods - part 1 (in Vietnamese), VNUHCM Publishing House, Vietnam, 2014 • Kusse B.R., Westwig E.A., Mathematical Physics - Applied Mathematics for Scientists and Engineers, 2ed, Wiley-VCH, 2006: chapter 5. • Boas, Mathematical Methods in the Physical Sciences, 3ed, Wiley, 2005: chapters 7, 9, 13. References: • Arfken, Mathematical methods for physicists _ a comprehensive guide, 7ed, Elsevier, 2012. • Riley, Essential Mathematical Methods for the Physical Sciences, CUP, 2011 • Chow, Mathematical methods for physicists, CUP, 2000

PHY10005 - Basic Electronics

Module designation	**Basic Electronics**
Semester(s) in which the module is taught	4th semester
Person responsible for the module	Assoc. Prof. HUYNH Van Tuan
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, discussion, practice, course projects
Workload (incl. contact hours, self-study hours)	150 Hours Contact hours: Lectures: 30 hours *(in class)* Practices: 30 hours Private study: 90 hours
Credit points	3 Credits/ 5 ECTS
Recommended prerequisites	General Physics
Module objectives/intended learning outcomes	This module aims to provide students with basic knowledge of the field of electronics, basic electronic circuits. Students learn the basics of semiconductor devices such as P-N junction, diode, bipolar junction transistor (BJT), field effect transistor (FET) and basic knowledge of ICs. Students who complete this module could be achieved the following: - Knowledge: Be able to apply knowledge in basic electronics. - Skills: Be able to work in individual to present technical reports in basic electronics problems. - Competences: Be able to design basic electronic circuits. - Attitude: be honest, responsible, respect for colleagues.
Contents	This module includes the following topics: 16. Introduction 17. The laws of electronic circuits 18. PN junction 19. Diods 20. Transistor 21. Small signal amplifier 22. Feedback amplifier 23. Operational amplifier 24. Power Amplifier 25. Oscillator circuit

Examination forms	Midterm test: multiple-choice and Final test: Written test
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 text books: • Huynh Van Tuan, Nguyen Chi Nhan, Electronic lecture: Basic Electronics, Faculty of Engineering Physics, University of Science, VNU-HCM. • Basic Electronics Practical Textbook, authored group of Faculty of Physics and Engineering, University of Science, VNU-HCM. References: Microelectronics Circuit Analysis and Design 3rd Edition, Donald A.Neamen, McGraw Hill, 2007

PHY10007 - Quantum Mechanics 1

Module name:	**Quantum Mechanics 1**
Semester(s) in which the module is taught	4th semester
Person responsible for the module	Dr. VU Quang Tuyen
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	*Lecture, lesson,* discussion, debate.
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
Recommended prerequisites	Calculus 1B&2B, Linear algebra, Functions of Complex Variable, General Physics, Mathematical Methods for Physics
Module objectives/intended learning outcomes	This course is aimed to introduce basic concepts and ideas on Quantum Mechanics: The Schrödinger equation, the wave function, operators, the mathematical formulations of quantum mechanics. Students will be able to solve the time-independent Schrödinger equation (TISE) for a variety of potentials in one and three dimensions, and apply TISE to the hydrogen atom and some simple problems of n-particle system. We will discuss the eigenvalue problems for energy, angular momentum, spin. Course Learning Outcomes: 1. Show a basic understanding of wave mechanics in one dimension (the Schrödinger, wave function and its statistical interpretation, observables and operators, the uncertainty principle), and the formalism of quantum mechanics. 2. Solve the time-independent Schroedinger equation for simple potentials in 1D and 3D; describe the structure of the hydrogen atom. 3. Identify and relate the eigenvalue problems for energy, momentum, angular momentum, spin, and n-particle system; explain the idea of spin and solve the eigenvalue problems for particle of spin 1/2. ● Skills/Competences/Attributes: Students will have opportunities to develop the skill(s)/competence(s)/ attribute(s) specified below:

	- Logical thinking, critical thinking and problem solving. - Communication. - Self-study, lifelong self-study. - Using specialized English terminology. - Responsibility, be honest; growth mindset; open-mindedness.
Content	This module includes the following topics: 1. Origins and the important role of Quantum Physics 2. The Wave Function 3. Time-Independent Schrödinger Equation 4. Formalism of Quantum Mechanics 5. Quantum Mechanics in Three Dimensions 6. Identical Particles
Examination forms	Paper assignment, Midterm test and Final test: written test
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: 1. D. J. Griffiths, D. F. Schroeter, *Introduction to Quantum Mechanics*, 2nd Ed., Cambridge University Press, 2018. References: 1. D. A. Fleisch, *A Student's Guide to the Schrödinger Equation*, Cambridge University Press, 2020. 2. J. J. Sakurai, J. Napolitano, *Modern Quantum Mechanics*, 2nd Ed., Cambridge University Press, 2017. 3. R. Shankar, *Principles of Quantum Mechanics*, Plenum Press, 1994.

PHY10008 - General Nuclear Physics

Module designation	**General Nuclear Physics**
Semester(s) in which the module is taught	4th semester
Person responsible for the module	Prof. CHAU Van Tao
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	*lecture, lesson, lab works,* discussion, debate,
Workload (incl. contact hours, self-study hours)	150 Hours Contact hours: Lectures: 30 hours *(in class)* Practice: 30 hours Private study: 90 hours *(self-study)*
Credit points	3 Credits/5 ECTS
Required and recommended prerequisites for joining the module	General physics 1, General physics 2, Modern Physics, Calculus 1B, Calculus 2B, Labwork on General Physics
Module objectives/intended learning outcomes	This module provides basic knowledge of nuclear physics Students who complete this module could be achieved the following: - *Knowledge: Be able to understand and explain concepts and some phenomena involving the nuclear physics.* Apply fundamental and in-depth knowledge of physics and mathematical formulation - *Skills: Be able to work in individual, group work, self-study, problem solving, and English reading skills.*lifelong self-study skills - *Competences: Be able to apply the knowledge in radiation measurements. Have the capacity to learning in the next periods.* *-Attitude and Ethics: Professional ethics and professional responsibility*
Content	This module includes the following topics: 26. Nuclear properties 27. Nuclear model 28. Nuclear reaction 29. Radioactivity 30. Interaction of radiation with matter 31. Radiation detection and measurement
Examination forms	Projects, Midterm: Practice test , Final test: Written test
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: • Chau Van Tao (2014). General Nuclear Physics. VNUHCM Publishing House, Vietnam. References: • A. Das and T. Ferbel (2003). Introduction to nuclear and Particle Physics. Second Edition. World Scientific Publishing Co Pte Ltd, Singapore. • G.F. Knoll (1989). Radiation detection and measurement. Second Edition. John Willey & Sons Inc, USA. • J.R. Lamarsh and A.J. Baratta (2001). Introduction to Nuclear Engineering. Third Edition. Prentice Hall Inc, USA. • W. R. Leo (1994). Techniques for Nuclear and Particle Physics Experiments. Second Edition. Springer-Verlag Berlin Heidelberg, Germany.

PHY10009 - Electrodynamics

Module designation	**Electrodynamics**
Semester(s) in which the module is taught	4th semester
Person responsible for the module	Dr. Le Van Ngoc
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, discussion, debate
Workload (incl. contact hours, self-study hours)	135 Hours Contact hours: Lectures: 45 hour *(in class)* Private study: 90 hours *(self-study)*
Credit points	3 Credits/ 4.5 ECTS
Recommended prerequisites	Calculus 1B, General physics
Module objectives/intended learning outcomes	This module provides knowledge about electromagnetic fields. Learners' expectations after completing this course are: Knowledge: Provides learners with a broader understanding of the relationship between electromagnetic fields and the distribution of charges and currents. In this module, we also repeat the two parts static electric field and static magnetic field, but using advanced mathematical tools, including vector analysis. From there, learners can explain electromagnetic phenomena, optics and beyond to solve problems in physics and engineering physics. Skill: Learners see more clearly the unity of electric and magnetic fields. A new perspective of the electromagnetic field. From the basic knowledge provided, learners are able to deduce the system of Maxwell's equations and this is considered the core basis of electrodynamics. Competences: The consequences from Maxwell's equations show that the electromagnetic field has a different mode of existence in space without the need for the distribution of electric charges and currents. From the new perception of the unity of electric and magnetic fields, learners have a new perception and see more clearly about the existence of matter. This is also a prerequisite for learners to participate in advanced and in-depth studies in some of physics specialties.

	Attitude and ethics: To pass this course, learners need to have the spirit of self-study, effort in thinking and a sense of self-discipline to complete the tests.
Content	This module includes the following topics: 1. Static electric field. 2. Static magnetic field. 3. Time-varying electromagnetic field. 4. Electromagnetic waves.
Examination forms	Midterm test: written test and Final test: essay
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: 1. Nguyen Huu Chi. (2003) Electrodynamics. HCMUS Publishing House, Vietnam. References: 1. Nguyen Kim Dinh, Nguyen Thanh Van (2004) Electromagnetic field. VNUHCM Publishing House, Vietnam.

PHY10010 - Solid State Physics

Module designation	**Name: Solid State Physics** **Code: PHY10010**
Semester(s) in which the module is taught	5th semester
Person responsible for the module	Assoc. Prof. Tran Quang Trung
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, discussion, debate.
Workload (incl. contact hours, self-study hours)	112.5 Hours Contact Hours: Lectures: 37.5 hours (in class) Private study: 75 hours (self-study)
Credit points	3 Credits/ 4.5 ECTS
Required and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	Main objective: This subject provides research methods of solid state physics, from simple models to derive the basic properties of main materials such as metals, dielectrics, and semiconductors. In addition, the subject also provides specialized knowledge such as energy band theory, and Fermi - Dirac distribution,... Students who complete this module could achieve the following: **- Knowledge:** Be able to understand and know crystal structure, crystal binding, crystal vibrations, thermal properties, free electron Fermi gas, energy bands and semiconductor crystals **- Skills:** Be able to work at individual level and group work. **- Competences:** be able to apply critical thinking, creativity, and professional knowledge to analyze and solve real problems **- Attitude:** Honest

Content	This module includes the following topics: - Crystal structure - Crystal binding - Phonons. Crystal vibrations - Phonons. Thermal properties. - Free electron Fermi gas - Energy bands - Semiconductor crystals
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:** 1. Le Khac Binh, Nguyen Nhat Khanh. (2002). Solid State Physics. VNUHCM Publishing House, Vietnam. **References:** 1. Charles Kittel. (2005). Introduction to Solid State Physics, 8th edition. John Wiley and Sons, New York 2. Neil W. Ashcroft, N. David Mermin (1976). Solid State Physics. Brooks Cole.

PHY10011 - Statistical Physics

Module designation	**Statistical Physics**
Semester(s) in which the module is taught	5th semester
Person responsible for the module	Assoc. Prof. NGUYEN Nhat Khanh
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	*Lecture,* discussion, debate.
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
Recommended prerequisites	Theoretical Mechanics; General physics 2,3
Module objectives/intended learning outcomes	This module presents the statistical theory of many-particle physical systems. The course presents four principles of thermodynamics, thermodynamic functions. The important parts of the module are classical and quantum distributions and their applications. Students who complete this module could be achieved the following: *- Knowledge: be able to understand the statistics of many-particle systems; analyze the classical and quantum distributions; microcanonical, canonical, and grand canonical ensembles.* *- Skills: group work, self-study.* *- Competences: have the basic methods and apply them in many-particle systems, Classical and Quantum thermodynamics systems.* *- Attitude and Ethic: Honesty, diligence, and responsibility.*
Content	This module includes the following topics: 1. Basic principles of statistical physics 2. Thermodynamic quantities 3. Classical statistical distributions 4. Quantum statistical distributions 5. The fluctuations of thermodynamic quantities 6. Some applications of statistical physics

Examination forms	Midterm test and Final test: essay
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: 1. Mehran Kardar, Statistical Physics of Particles, Cambridge University Press; 1st edition, 2007 References: 2. F. Reif, Fundamentals of Statistical and Thermal Physics, Waveland Pr Inc; 56946th edition, 2008. 3. Charles Kittel, Elementary Statistical Physics, Dover Publications; Illustrated edition, 2004. 4. Charles Kittel and Herbert Kroemer, Thermal Physics, W. H. Freeman; Second edition, 1980. 5. Mehran Kardar, Statistical Physics of fields, Cambridge University Press; 1st edition, 2007.

PHY10012 - Atomic Physics

Module designation	**Atomic Physics**
Semester(s) in which the module is taught	5th semester
Person responsible for the module	Dr. NGUYEN Huynh Tuan Anh
Language	Vietnamese
Relation to curriculum	Compulsory
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/ 3ECTS
Recommended prerequisites	Calculus 1B, 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 be achieved the following: - Knowledge: Be able to understand and apply knowledge of atomic phýics in science and life. - Skills: Be able to work in individual, group work, self-study, lifelong learning, and problem solving. - Competences: Be able to design a simple experiment involving electromagnetism and optics. Have the capacity to learn in the next period.
Content	This module includes the following topics: 1. Introduction 2. Many-body problems, systems of identical particles 3. Basic concepts of quantum mechanics 4. Elementary Atomic spectra 5. Atoms in Strong Fields, Zeeman effect
Examination forms	Midterm test and Final test: written test
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:** 1. Nguyen Minh Thuy, Atomic Physics, University of Education, 2011. 2. Lim Yung-Kuo, Atomic, nuclear and elementary particle physics exercises and solutions, Education Publishing House, 2008 **References:** 1. Luong Duyen Binh,… General Physics: Volume III, Education Publishing House, 1998 2. J. Yarwood, Atomic physics, Tutorial Press, 2000 3. J. B. Rajam, Atomic physics, Schand & Company LTD, 2007.

NTE10101 - Fundamental Physics of Radioactivity

Module designation	**Fundamental Physics of Radioactivity**
Semester(s) in which the module is taught	5th Semester
Person responsible for the module	Assoc. Prof. TRUONG Thi Hong Loan
Language	Vietnamese
Relation to curriculum	Compulsory course
Teaching methods	Lecture and lesson, exercise…
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	General Nuclear Physics, Quantum Mechanics
Module objectives/intended learning outcomes	This module provides knowledge related to the physics of the basic radioactive decay processes: alpha decay, beta decay, and gamma transition. In which, for each type of decay, state the energy characteristics, the conditions for decay, using quantum mechanics for evaluating the corresponding decay probability. Students who complete this module could be achieved the following: - Knowledge: + Apply fundamental and in-depth knowledge of physics of radioactive decay and quantum mechanics for calculating decay probability of alpha, beta and gamma transition (2). + Apply knowledge of physics of radioactive decay in order to solve problems in the field of nuclear physics (3). - Skills: logical thinking (1), lifelong self-study skills (2), specialized English for scientific research, and problem solving (3). - Competences: Ability to apply physics knowledge and experience to conceptualize, analyze and design new physical situations (1). - Attitude and ethics: professional ethics, and professional responsibility.
Content	This module includes the following topics:

	1. An Introduction to radioactive decay 2. Physics of alpha decay 3. Physics of gamma transition 4. Physics of beta decay
Examination forms	Essay
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	4. W.N. Cottingham, D.A. Greenwood, "An Introduction to Nuclear Physics", second edition, Cambridge University Press, 2004. 5. Robley D. Evans, "The Atomic Nucleus", McGraw-Hill, 1988. 6. Anwar Kamal, "Nuclear Physics", Springer, 2014. 7. Joseph Magill, Jean Galy, "Radioactivity – Radionuclides – Radiation", Springer, 2005. 8. Laraweb - http://www.nucleide.org/Laraweb/

NTE10102 - Radiation Detection Techniques

Module designation	**Radiation Detection Techniques**
Semester(s) in which the module is taught	5th Semester
Person responsible for the module	Dr. VO Hong Hai
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, laboratory...
Workload (incl. contact hours, self-study hours)	150 Hours Contact hours: Lectures: 30 hours *(in class),* laboratory: 30 hours Private study: 90 hours *(self-study)*
Credit points	3 Credits/ 5 ECTS
Required and recommended prerequisites for joining the module	General Nuclear physics, General electronic
Module objectives/intended learning outcomes	This module provides basic knowledge of radiation interaction with matter, radiation detector, electronic for detector, coincidence technique,… Students who complete this module could be achieved the following: *- Knowledge:* *+ Apply basic knowledge of radiation interaction, materials for detector, nuclear electronics to build a nuclear detector.* *+Apply fundamental and in-depth knowledge of radiation detectors to measure radiation and determine dose, energy spectra, and radioisotopes.* *+ Apply knowledge of radiation, nuclear electronic to solve problems in nuclear physics.* *- Skills:* *+ Gain effective career skills for design a simple experiment involving radiation detection.* *+Acquire personal skills such as self-learning a programing language, work in individual, group work, self-study and lifelong learning and problem solving.* *+ Using specialized English terminology for nuclear physics scientific research and personal development.*

	- Attitude and ethics: *+ Understand professional culture, professional ethics, professional responsibility, respect themselves, colleagues, and to be honest.*
Content	This module includes the following topics: 1. Introduction of radiation, units, nuclear level diagram. 2. Interaction of radiation in matter. 3. Detectors based on ionization in gases. 4. Detectors based on scintillation. 5. Detectors based on ionization in semiconductor materials. 6. Neutron detectors. 7. Electronics for radiation detectors. 8. Basic coincidence techniques.
Examination forms	Oral exam, essay
Study and examination requirements	Assessment method: 1. Self-written assay= 10% 2. Assignment: Individual activities = 10% 3. Midterm test= 30% 4. Final test= 50%

NTE10103 - Statistical Data Analysis for Experimental Data in Nuclear Engineering

Module designation	**Statistical Data Analysis for Experimental Data in Nuclear Engineering**
Semester(s) in which the module is taught	*6th semester*
Person responsible for the module	*Assoc Prof. Truong Thi Hong Loan* *MsC. Nguyen Duy Thong*
Language	*Vietnamese*
Relation to curriculum	*Compulsory* *Specialisation*
Teaching methods	*lecture, lesson, lab work*
Workload (incl. contact hours, self-study hours)	150 Hours Contact hours: Lectures: 30 hours *(in class)* Practice: 30 hours Private study: 90 hours *(self-study)*
Credit points	3 Credits / 5 ECTS
Required and recommended prerequisites for joining the module	*Nuclear physics, probability statistics,*
Module objectives/intended learning outcomes	*Key question: what learning outcomes should students attain in the module?* *Knowledge:* - *familiarity with errors, error propagation, characteristics of experimental data, methods to estimate statistical parameters.* - *statistical hypothesis test, correlations of experimental data* - *fitting based on maximum likelihood* *Skills:* - *Basics IT(excel) skill in data analysis* - *Utilization of data analysis knowledge in real data* *Attitude:* - *Understanding methods in data analysis* - *Applying methods in real data*

Content	*Chapter 1: Error in experimental data, significant number, rounding a value, writing a result with error.* *Chapter 2: Chateracteristics of exeperimental data: mean, variance, standard deviation, median, probability distribution function.* *Chapter 3: Error progation, some methods to reduce statistical erorrs.* *Chapter 4: Estimation of mean, erorr, standard deviation* *Chapter 5: Statistical hypothesis test: U-test, T-test, p-value, remove a number based on Chauvennet principle.* *Chapter 6: Fitting experimental data based on maximum likelihood.* *Chapter 7: Correlation of 2 types data*
Examination forms	*Writting and working on computer*
Study and examination requirements	*The total scores include: mid-term exam(30%), final exam(50%) , pratical exam or attendance (20%).* *In order to sucessfully passing the course, students must have total scores greater than 5.0*
Reading list	Syllabus: Trương Thị Hồng Loan, Châu Văn Tạo, Lê Bảo Trân *, Phân tích thống kê số liệu thực nghiệm trong ghi đo bức xạ*, ĐHQG-HCM, 2014 Reading list: - Lê Hồng Khiêm, *Phân tích số liệu trong ghi nhận bức xạ*, ĐHQG-HN, 2014 - Knoll G.F, *Radiation Detection and Measurement, Third Edition*, John Wiley & Sons, Inc. 1999 - Philip R. Bevington, D. Keith Robinson , *Data reduction and error analysis for the physical sciences*, Mc Graww Hill, Inc., 1992

NTE10104 - Fundamental Practice in Nuclear Technique

Module designation	**Fundamental Practice in Nuclear Technique**
Semester(s) in which the module is taught	6th semester
Person responsible for the module	Dr. VO Hoang Nguyen
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, lab work
Workload (incl. contact hours, self-study hours)	120 Hours Contact hours: laboratory: 60 hours *(in class)* Private study: 60 hours *(self-study)*
Credit points	2 Credits/ 4 ECTS
Required and recommended prerequisites for joining the module	General Nuclear Physics
Module objectives/intended learning outcomes	This module provides required knowledge and skills to operate, analyze nuclear measurement system. It helps students to practice some advanced experiments to understand and operate some nuclear equipments. Students who complete this module could be achieved the following: *- Knowledge: Apply basic knowledge of natural science and advanced nuclear radiation measurement by radiation detectors such as Geiger Muller, NaI(Tl), HpGe gamma spectroscopy, alpha spectroscopy, X-ray spectroscopy, neutron activation analysis system and finally learn how to perform data analysis.* *- Skills: Acquire career abd personal skills such as in individual work, group work, lifelong self-study skills, critical thinking in practice, design and conduct advanced nuclear radiation measurement experiments; using specialized English terminology and information technology to perform experiment data analysis.* *- Competences: Ability in planning, teamwork and effective communication; Ability to to design an advanced experiment to measure radiations, analyze data and make report.*

	- Attitude and ethics: Understand radiation safety culture, professional ethics and professional responsibility, be honest
Content	This module includes the following topics: 1. Nuclear electronics 2. Characteristic curve and operating voltage of detector 3. Count rate and errors 4. Statistical distribution of radioactive decay 5. Optimizing measurement time 6. Dead time and efficiency 7. Gamma attenuation through matter 8. Determinating energy of an unknown source and resolution 9. Ionizing radiation safety 1 10. Neutron activation analysis: qualitative measurement 11. X-ray fluoresence analysis: qualititive measurement 12. Alpha Acquisition and Analysis Software in alpha spectroscopy analysis
Examination forms	Oral presentation, practice test.
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: 1. Department of Nuclear Physics (2013). Fundamental Practice in Nuclear Physics. University of Science, VNU-HCM. References: 2. G.L Knoll (2001). Radiation detection and measurement. Third edition. John Wiley & Sons, Ins.

NTE10105 - Radiation safety

Module designation	**Nuclear Safety and Dosimetry**
Semester(s) in which the module is taught	6th Semester
Person responsible for the module	Prof. CHAU Van Tao
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, exescise…
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	Nuclear physics, Nuclear reactions, Radioactive physics.
Module objectives/intended learning outcomes	Students who complete this module could be achieved the following outcomes: - Knowledge: + Understanding of nuclear radiation quantities and units, interaction of radiation with matter, effects of radiation on the human species, standards of radiation protection, principles of shielding, methods of doses measurement. + Calculating of radiation effects and computing of exposure and doses. - Skills: Be able to work in individual, group work, self-study, lifelong learning, and problem solving. - Competences: Be able to design a simple experiment involving estimation of radiation doses. Have the capacity to learn in the next periods.

Content	This module includes the following topics: 1. Basic concepts and units for radiological, nuclear and process safety 2. Interaction of radiation with matter 3. Biological effects of radiation 4. Radiation safety Guides 5. Evaluation for radiation protection 6. Measurements of dosimetry based on ionization 7. Measurements of dosimetry based on luminescence 8. The basic principles of film badge dosimetry 9. Neutron dosimetry
Examination forms	Midterm test and Final test: essay
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:** 1. Chau Van Tao (2004). Ionizing radiation safety. VNUHCM Publishing House, Vietnam. 2. Chau Van Tao (2005). Ionizing radiation dose. VNUHCM Publishing House, Vietnam. **References:** 1. K. N. Mukhin (1987). Experimental nuclear physics. Mir Publishers, Russia. 2. H. Cember (1996). Introduction to Health Physics Third Edition. McGraw-hill, United Kingdom. 3. W. N. Cottingham, D.A. Greenwood (2001). Introduction to atomic and nuclear physics. Second edition. Cambridge University Press, United Kingdom.

NTE10106 - Informatics Applied in Nuclear Technique

Module designation	**Informatics Applied in Nuclear Technique**
Semester(s) in which the module is taught	6th semester
Person responsible for the module	Dr. VO Hong Hai
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Labworks
Workload (incl. contact hours, self-study hours)	120 Hours Contact hours: Labworks: 60 hours *(in class)* Private study: 60 hours *(self-study)*
Credit points	2 Credits/ 4 ECTS
Required and recommended prerequisites for joining the module	Fundamental Nuclear Physics, Basic Information technology,
Module objectives/intended learning outcomes	This module provides basic knowledge of C++ programing, method of Monte-Carlo simulation, a simulation software toolkit, simulate radiation interaction with material, simulate a radiation detector, analysis characteristics of the detector and data analysis. Students who complete this module could be achieved the following: *- Knowledge:* *+Apply basic knowledge of C++ programing language to solving problems in Physics and Monte-Carlo simulation.* *+Apply fundamental and in-depth knowledge of simulation software toolkit to simulate radiation interacts with material, radiation detector. (KNO-2).* *+ Apply knowledge of informatics to solve problems in nuclear physics.* *- Skills:* *+ Gain effective career skills for problem solving in nuclear physics, including skills such as logical thinking, scientific research, practice, design and conduct simulation.*

	+Acquire personal skills such as self-learning a programing language, work in individual, group work, self-study and lifelong learning and problem solving. *+ Using specialized English terminology and information technology for a logical thinking, scientific research and personal development.* *- Competences:* *+ Ability to design a simulation of nuclear detector to study radiation.* *+ Ability in organization, planning, teamwork and effective communication in science and social interaction.* *+ Ability to analyze and evaluate simulation data.* *- Attitude and ethics:* *+ Understand professional culture, professional ethics, professional responsibility, respect themselves, colleagues, and to be honest.*
Content	This module includes the following topics: 1 C++ programing language and Ubuntu OS. 2 Basic Monte-Carlo simulation. 3 Simulation toolkit of Geant4. 4 Build particle Gun, Geometry and Material, PhysicsList and Set cut. 5 Simulate Gas detector for dose 6 Simulate scintillator/semiconductor detector for energy spectrum 7 ROOT data analysis framework.
Examination forms	Midterm test and Final test: essay
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: 1 C++ programing language guide. 2 Monte-Carlo simulation method guide. 3 Geant4 simulation toolkit guide. 4 ROOT data analysis guide. References:

	1 http://www.cplusplus.com/ 2 https://geant4.web.cern.ch/ 3 https://root.cern.ch/

NTE10107 - Principles and Applications of Accelerator

Module designation	**Principles and Applications of Accelerator**
Semester(s) in which the module is taught	6th semester
Person responsible for the module	Dr. TRINH Hoa Lang
Language	Vietnamese
Relation to curriculum	Elective
Teaching methods	Lecture, lesson...
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	Calculus 1B, General physic
Module objectives/intended learning outcomes	This module provides basic knowledge on particle accelerator for students. The information of this subject is included principles of charged particle accelerator, linear and circular accelerators Students who complete this module could be achieved the following: *- Knowledge: Apply knowledge of particle accelerator principle in nuclear physics and life.* *- Skills: lifelong self-study, and problem solving.* *- Competences: apply physics knowledge analyze new physical situations, methods and research results in a specific science and life.* *- Attitude and ethics: professional ethics, and professional responsibility.*
Content	This module includes the following topics: 1 Particle Dynamics 2 Electric and Magnetic Forces 3 Electric and Magnetic Field Lenses 4 Calculation of Particle Orbits in Focusing Fields 5 Linear accelerators 6 Circular accelerators

Examination forms	Midterm and Final test: essay test
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 orequal to 5.0/10.0.
Reading list	Main books: 1. Stanley Humphries, Jr, Principles of charged particle accelerator, John Wiley and Sons, 1999. References: 1. Helmut Wiedemann, Particle Accelerator physics, Springer, 2007. 2. Martin Reiser, Theory and Design of Charged Particle Beams, Wiley-VCH, 2008 3. J.B. ROSENZWEIG, Fundamentals of Beam Physics, Oxford University Press, 2003. 4. Helmut Liebl, Applied Charged Particle Optics, Springer-Verlag Berlin Heidelberg 2008

NTE10108 - Nuclear Technique Applied in Industry

Module designation	**Nuclear Technique Applied in Industry**
Semester(s) in which the module is taught	7th semester
Person responsible for the module	Assoc. Prof. TRAN Thien Thanh
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, exercise...
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	Radiation Measurement and Detection Methods. Nuclear Safety and Dosimetry Statistical Analysis for Experimental Data in Nuclear Physics
Module objectives/intended learning outcomes	This module provides knowledge of nuclear techniques applying industry. This course presents the principle of transmission gamma method, Compton scattering method, radioactive tracer technique, radiography, and whose applications in industries Students who complete this module could be achieved the following: *- Knowledge: apply knowledge of nuclear physics such as non-destructive testing (NDT), nucleonic control system (NCS), radioactive tracer, and irradiation methods in industrial system.* *- Skills: lifelong self-study skills, specialized English for scientific research, and problem solving.* *- Competences: teamwork, and effective communication in science, analyze and evaluate experimental results.* *- Attitude and ethics: professional ethics, and professional responsibility*
Content	This module includes the following topics: 1. The basis physics of radioactivity

	2. Radiation detection 3. Biological effects of radiation and radiological protection 4. Radiography 5. Gamma-ray absorption techniques 6. Radiation scattering techniques 7. Radioactive tracer applications 8. Irradiation
Examination forms	Midterm and final exam: essay 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	References: 1 Radioisotope techniques for problem solving in industrial process plants, J.S. Charlton, Leonard Hill, Glasgow and London. 2 Technical data on nucleonic gauges, IAEA-TECDOC-1459, 2005. 3 Radiotracer Applications in Industry — A Guidebook, IAEA-TECDOC 423, 2004
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 orequal to 5.0/10.0.
Reading list	Main books: 1. Le Cong Hao, Tran Thien Thanh, Chau Van Tao "Nuclear Technique Applied in Environment and Geology", unpublish. 2. Claude J. Alle`gre (2008) "Isotope Geology", Cambridge University Press References: 1. Pham Duy Hien, Radioactivity in the environment and waste sources, Science and Technology Publishing House, 2014.

	2. Dang Duc Nhan, Ngo Quang Huy, Nguyen Hao Quang, Radiometric recording techniques applied in environmental research, Science and Technology Publishing House, 2014. 3. C. Zhang, Fundamentals of environmetnal sampling and analysis, John Wiley & Sons, 2007. 4. M. F. L'Annunziata, 2nd, A Handbook of radioactiovity analysis, Academic Press, New York, USA, 2003. 5. Merril Eisenbud, Thomas Gesell, Environmental radioactivity from natural, industrial and military sources, Academic press, 1997.

NTE10109 - Nuclear Technique Applied in Environment and Hydrography -

Module designation	**Nuclear Technique Applied in Environment and Hydrography**
Semester(s) in which the module is taught	7th semester
Person responsible for the module	Assoc. Prof. LE Cong Hao
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, exercise...
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	General Nuclear physics, Method of Radiation Detection and Measurement
Module objectives/intended learning outcomes	This module provides basic knowledge of: - Nuclear techniques in the measurement of radioactivity of nuclei in the environment. - Instrumentation and analytical techniques used in isotope geochemistry - Surveying natural radioactive fields emitted from rocks or water to solve geological mapping, finding radioactive ores… - Determination of geological time. Students who complete this module could be achieved the following: - Knowledge: Be able to understand not only how and why some nuclei decay, but also in understanding the processes that create nuclei and the behaviour itself. - Skills: Be able to work in individual, group work, self-study, lifelong learning, problem solving, and English reading skill in nuclear physics. - Competences: Be able to apply instrumentation and analytical techniques used in isotope geochemistry. Have the capacity to learning in the next periods. - Attitude and ethics: professional ethics, and professional responsibility.

Content	This module includes the following topics: 1. Introduction of radiation and natural background radiation. 2. Methods of nuclear analysis in environmental radiation measurement. 3. Gamma measurement method in well geophysical research. 4. Radiometric techniques in geological dating. 5. Radiometric techniques in isotope hydrology.
Examination forms	Midterm and Final test: essay test
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 orequal to 5.0/10.0.
Reading list	**Main books:** 1. Le Cong Hao, Tran Thien Thanh, Chau Van Tao "Nuclear Technique Applied in Environment and Geology", unpublish. 2. Claude J. Alle`gre (2008) "Isotope Geology", Cambridge University Press **References:** 1. Pham Duy Hien, Radioactivity in the environment and waste sources, Science and Technology Publishing House, 2014. 2. Dang Duc Nhan, Ngo Quang Huy, Nguyen Hao Quang, Radiometric recording techniques applied in environmental research, Science and Technology Publishing House, 2014. 3. C. Zhang, Fundamentals of environmetnal sampling and analysis, John Wiley & Sons, 2007. 4. M. F. L'Annunziata, 2nd, A Handbook of radioactiovity analysis, Academic Press, New York, USA, 2003. 5. Merril Eisenbud, Thomas Gesell, Environmental radioactivity from natural, industrial and military sources, Academic press, 1997.

NTE10110 - Nuclear Reactor Technology and Nuclear Power Plant

Module designation	**Nuclear Reactor Technology and Nuclear Power Plant**
Semester(s) in which the module is taught	7th semester
Person responsible for the module	Dr. PHAN Le Hoang Sang
Language	Vietnamese
Relation to curriculum	Elective
Teaching methods	Lecture, lesson, exercise...
Workload (incl. contact hours, self-study hours)	105 Hours Contact hours: Lectures: 15 hours (in class) Exercise: 30 hours Private study: 60 hours (self-study)
Credit points	2 Credits / 3.5 ECTS
Required and recommended prerequisites for joining the module	Nuclear Physics Theory, Physics of Radioactivity, Neutron Physics and Nuclear Reactor
Module objectives/intended learning outcomes	This module provides basic knowledge of history and status of nuclear power, generations of nuclear reactor, nuclear reactor design, , components of nuclear power plant, operation principles of nuclear reactor as well as nuclear power plant safety. Students who complete this module could be achieved the following: - Knowledge: Apply knowledge of nuclear reactor physics to understand the nuclear reactor design, nuclear power plant structure, principles of nuclear power plant and safety - Skills: + Acquire career and personal skills such as communication skills, lifelong self-study skills, critical thinking skills in nuclear reactor engineering + Using specialized English in the field of nuclear reactor enigineering and nuclear power plant - Competences: Ability in planning, teamwork and effective communication, analyzing structure of nuclear power plant and its operation, understanding nuclear safety, radiation safety in nuclear power plant

	- Attitude and ethics: Understand professional safety culture, professional ethics and professional responsibility, be honest
Content	This module includes the following topics: 1. History of nuclear power 2. Nuclear reactor design 3. Structure and components of nuclear power plant 4. Operation principle of nuclear reactors 5. Nuclear power plant safety
Examination forms	Midterm and Final test: essay test
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 orequal to 5.0/10.0.
Reading list	**Main books:** 1. John R. Lamarsh (2001). Introduction to Nuclear Engineering. Third edition. Prentice Hall, New York. **References:** 1. Janet Wood (2007). Nuclear Power. IET power and energy series 52, UK. 2. Ronald Allen Knief (2008). Nuclear Engineering: Theory and Technology of Commercial Nuclear Power. American Nuclear Society. 3. Yoshiaki Oka, Katsuo Suzuki (2013). Nuclear Reactor Kinetics and Plant Control. Springer. 4. DOE Fundamentals Handbook (1993). Nuclear Physics and Reactor Theory. 5. IAEA Safety Guides. Design of the Reactor Coolant System and Associated Systems in NPP. No. NS-G-1.9. 6. IAEA Safety Standards (2012). Safety of Nuclear Power Plants: Design Specific Safety Requirements.

NTE10111 - Nuclear Reaction and Structure

Module designation	**Nuclear Reaction and Structure**
Semester(s) in which the module is taught	5th Semester
Person responsible for the module	Prof. CHAU Van Tao
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, exercise..
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	General nuclear physics, Modern physics, Quantum mechanics, Quantum Electrodynamics
Module objectives/intended learning outcomes	This module provides knowledge of nuclear structure, strong force, nuclear model, and nuclear reaction. Students who complete this module could be achieved the following: *- Knowledge: Be able to understand and apply knowledge of nuclear physics in science and life.* *- Skills: Be able to work in individual, group work, self-study, Self-motivation, mathematical skills, communication skills, and problem solving.lifelong self-study skills* *- Competences: Be able to read the international journal involving the nuclear theory and perform a program to calculate the physical quantities of the nuclear models and reactions,information technology for scientific research and personal development*. *-Attitude and Ethics: Professional ethics and professional responsibility*
Content	This module includes the following topics: 1. Introduction about nuclear structure models 2. The liquid drop model 3. Independent particle model 4. Shell model 5. Unified model with collective and single motions

	6. Quantum mechanics theory of many-particle system & nuclear structure 7. Classification of nuclear reactions 8. The conservation laws governing nuclear reactions 9. Compound nucleus reactions 10. The optical model 11. Direct reactions 12. Nuclear reactions induced by particle types 13. Nuclear fission and fusion
Examination forms	oral presentation, essay, etc…
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: 1. Chau Van Tao (2013). Nuclear Physics. VNUHCM Publishing House, Vietnam. References: 1. Ngo Quang Huy (2010). Basic of Nuclear Physics. Science and Technics Publishing House, Vietnam. 2. Dao Tien Khoa (2012). Modern Nuclear Physics. Science and Technics Publishing House, Vietnam. 3. D. Halliday (1971). Introduction Nuclear Physics. Modern ASIA Edition, Japan. 4. I.K. Yodin (1982). Nuclear Physics. Mir Publishers, Moscow. 5. W.N. Cottingham and D.A. Greenwood (2001). Introduction to atomic and nuclear physics. Second Edition. Cambridge University Press, Cambridge. 6. K.N. Mukhin (1987). Experimental Physics. Mir Publishers, Moscow. 7. H. Ethering (1972). Nuclear Engineering Handbook. McGraw-Hill book Company, New York..

NTE10112 - Reactor Nuclear Physics

Module designation	**Reactor Nuclear Physics**
Semester(s) in which the module is taught	5th Semester
Person responsible for the module	Assoc. Prof. HUYNH Truc Phuong Dr. Phan Le Hoang Sang
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, exercise…
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	Nuclear Theory, Fundamental Nuclear Physics
Module objectives/intended learning outcomes	This module helps students to have knowledge of basic properties of neutrons, interaction of neutrons with matter, nuclear reactions with neutrons, fission reactions, chain reactions, nuclear energy, diffusion scatter and transport of neutrons in matter. Students who complete this module could be achieved the following: *- Knowledge: Able to understand the process of neutron interaction with matter in the reactor. Apply the calculations of physical parameters related to the nuclear reactor.* *- Skills: Able to work in individual, group work, self-study, and problem solving.* *- Competences: Able to establish the operating procedure of a basic reactor. .* *- Attitude and Ethic: Honesty, diligence, and responsibility*
Content	This module includes the following topics: 1. Nuclear reactions with neutrons 2. Slowing down neutrons 3. Neutron diffusion theory 4. Chain nuclear reaction 5. Kinetics of nuclear reactors

	6. Time dependence of nuclear reactor
Examination forms	Midterm test and Final test: essay
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: 1. Huynh Truc Phuong (2016). Nuclear Reactor Physics. VNUHCM Publishing House, Vietnam. References: 1. Ngo Quang Huy (2005). Nuclear Reactor Physics. VNUHN Publishing House, Vietnam. 2. John R. Lamarsh (2001). Introduction to Nuclear Reactor Theory. Addison-Wesley Publishing Company, New York, USA.

NTE10113 - Radiation Technology

Module designation	**Radiation Technology**
Semester(s) in which the module is taught	7th semester
Person responsible for the module	Dr. VO Hoang Nguyen
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, exercise.
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	General Nuclear Physics, Fundamental Physics of Radioactivity, Radiation Safety, Radiation Detection Techniques.
Module objectives/intended learning outcomes	This module presents basic knowledge, principles, and processes for synthesizing and modifying materials using nuclear radiation. In addition, the module also presents basic principles of exhaust gas treatment, food irradiation and sterilization by nuclear radiation. Students who complete this module could be achieved the following: - Knowledge: Understand some applications of radiation technology, the basic principles and processes of material synthesis and polymer material modification using radiation technology, the basic process of exhaust gas treatment using electron beam, biological and chemical effects of food due to irradiation, steps taken in radiation sterilization. - Skills: Ability to plan, work in teams and communicate effectively; Ability to calculate radiation doses for certain purposes. - Competences: Ability to select appropriate radiation doses for radiotherapy grafting and angioplasty, calculate radiation dose for exhaust gas treatment using electron beam, calculate radiation dose for irradiated foods and radiation sterilization. - Attitude and ethics: Have a vision of application issues of radiation technology in industry, materials science, environment and other fields. Be conscious and strategic

	in finding and discovering new problems and subjects in industry, materials science, environment and other fields that can be solved by radiation technology.
Content	This module includes the following topics: 1. Polymerization and modification of polymer materials. 2. Application of electron beam to treat exhaust gases from factories. 3. Food irradiation. 4. Radiation sterilization.
Examination forms	Group presentation, essay.
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:** 1. Giáo trình xử lý bức xạ và cơ sở của công nghệ bức xạ, Trần Đại Nghiệp, NXB Đại học quốc gia Hà Nội, 2006. **References:** 1. Năng lượng nguyên tử và đời sống, Đinh Ngọc Lân, NXB Văn hóa thông tin, 2004. 2. Dosimetry for food irradiation, Technical report series no. 409, IAEA, Vienna, 2002. 3. Emerging applications of radiation processing, IAEA, Vienna, 2004.

NTE10114 - Nuclear Analytical Technique

Module designation	**Nuclear Analytical Technique**
Semester(s) in which the module is taught	6th semester
Person responsible for the module	Assoc. Prof. HUYNH Truc Phuong
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, exercise...
Workload (incl. contact hours, self-study hours)	135 Hours Contact hours: Lectures: 45 hours *(in class)*, exercise: 0 Private study: 90 hours *(self-study)*
Credit points	3 Credits/ 4.5 ECTS
Required and recommended prerequisites for joining the module	Radiation Measurement and Detection Methods,
Module objectives/intended learning outcomes	This module provides students with an understanding of nuclear analysis methods such as X-ray fluorescence analysis (XRF) and neutron activation analysis (NAA). Students who complete this module could be achieved the following: *- Knowledge: Able to understand the interaction of X-rays and of neutrons with matter. Able to apply XRF and NAA analysis methods in sample analysis.* *- Skills: Able to work in individual, group work, self-study, and problem solving.* *- Competences: Able to establish the process of sample analysis by atomic and nuclear method. Able to evaluate the results of analysis of elemental content in samples.* *- Attitude and Ethic: Honesty, diligence, and responsibility.*
Content	This module includes the following topics: 1. Fundamentals of XRF analysis 2. XRF analysis methods 3. Matrix effects and correction methods 4. Introduction to neutron activation analysis (NAA) 5. Basic equation in NAA analysis 6. NAA analysis methods 7. Sample preparation

	8. Error of measurements
Examination forms	Midterm and final exam: essay exams.
Study and examination requirements	Assessment method: 1. Homework assignment= 10% 2. Assignment: Individual activities = 10% 3. Midterm test= 30% 4. Final test= 50%
Reading list	Main books: 1. Huynh Truc Phuong, Tran Phong Dung, Chau Van Tao (2015). Atomic and Nuclear Analysis Methosds. For internal circulation only, University of Science, VNUHCM, Vietnam. References: 1. Raymond A. Serway, John W. Jewett, Sr (2014). Physics for Scientists and Engineers with Modern Physics. Ninth Edition. BROOK/COLE, USA. 2. Alan Giambattista, Betty McCarthy Richardson, Robert C. Richardson (2010). Physics. Second Edition. McGrawHill, USA.

NTE10115 - Advanced Practice in Nuclear Technique

Module designation	**Advanced Practice in Nuclear Technique**
Semester(s) in which the module is taught	7th semester
Person responsible for the module	Dr. VO Hoang Nguyen
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, lab work
Workload (incl. contact hours, self-study hours)	120 Hours Contact hours: laboratory: 60 hours (in class) Private study: 60 hours (self-study)
Credit points	2 Credits/ 4ECTS
Required and recommended prerequisites for joining the module	Fundamental Practice in Nuclear Technique
Module objectives/intended learning outcomes	This module provides required knowledge and skills to operate, analyze nuclear measurement system. It helps students to practice some advanced experiments to understand and operate some nuclear equipments. Students who complete this module could be achieved the following: - Knowledge: Apply basic knowledge of natural science and advanced nuclear radiation measurement by radiation detectors such as Geiger Muller, NaI(Tl), HpGe gamma spectroscopy, alpha spectroscopy, X-ray spectroscopy, neutron activation analysis system and finally learn how to perform data analysis. - Skills: Acquire career abd personal skills such as in individual work, group work, lifelong self-study skills, critical thinking in practice, design and conduct advanced nuclear radiation measurement experiments; using specialized English terminology and information technology to perform experiment data analysis. - Competences: Ability in planning, teamwork and effective communication; Ability to to design an advanced experiment to measure radiations, analyze data and make report.

	- Attitude and ethics: Understand radiation safety culture, professional ethics and professional responsibility, be honest
Content	This module includes the following topics: 1. Neutron activation analysis: quantitative measurement 2. Using Genie-2K in gamma spectroscopy analysis 3. Ionizing radiation safety 2: dose distribution of gamma source 4. Back scattering 5. Neutron dosimeter 6. Liquid level measurement by gamma tranmission method 7. Quantitative analysis by X-ray fluorescent method 8. Determination radioactivity of alpha source by alpha spectroscopy 9. Determination stopping range of alpha particle in air 10. Alpha Acquisition and Analysis Software in alpha spectroscopy analysis Neutron activation analysis: qualitative practice
Examination forms	Oral presentation, Practice test
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:** 1. Department of Nuclear Physics (2013). Advanced Practice in Nuclear Physics. University of Science, VNU-HCM. **References:** 1. G.L Knoll (2001). Radiation detection and measurement. Third edition. John Wiley & Sons, Ins. 2. G.D. Chase, S. Rituper, J.W. Sulcoski (1964). Experiments in nuclear science. 2nd, Aplha editon. 3. J.L. Ducan (1988). Laboratory investigation in nuclear science. Oak Ridge TN, USA.

NTE10116 - Nuclear Technique Applied in Agricultural-Medical-Biology

Module designation	**Nuclear Technique Applied in Agricultural-Medical-Biology**
Semester(s) in which the module is taught	7th semester
Person responsible for the module	Assoc. Prof. LE Cong Hao
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, exercise...
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	General Nuclear physics, Method of Radiation Detection and Measurement
Module objectives/intended learning outcomes	This module provides basic knowledge of: -Basic concepts of nuclear physics - Radiation interactions with matter - Application in biology, agriculture and medicine - Proton therapy physics Students who complete this module could be achieved the following: *- Knowledge: Be able to understand radiation interaction with matter and using in agriculture, medicine and biology.* *- Skills: Be able to work in individual, group work, self-study, lifelong learning, problem solving, and English reading skill in nuclear physics.* *- Competences: Be able to apply nuclear physics in Agricultural-Medical-Biology. Have the capacity to learning in the next periods.* *- Attitude and ethics: professional ethics, and professional responsibility*
Content	This module includes the following topics: 1. Radiation interactions with matter. 2. Exposure and absorbed dose.

	3. Introduction some applications of radiology in biology and agriculture. 4. Introduction some applications of radiology in medicine
Examination forms	Midterm and final exam: essay 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 books: 1. Le Cong Hao, Tran Thien Thanh, Chau Van Tao "Applied Nuclear Physics in Agricultural-Medical-Biology", unpublish. 2. Phan Van Duyet, (1998) "Radiophysiological and physical methods used in agriculture, biology and medicine", Science and Technology Publishing House, Hanoi, Vietnam. • References: 1. Tran Phong Dung, Chau Van Tao, Nguyen Hai Duong, Methods of recording ionizing radiation, Publishing House, National University of Ho Chi Minh City. Ho Chi Minh, 2005. 2. F. M. Khan, The physics of the Radiation Therapy, Williams & Wilkins, 1994. 3. Philip M.K. Leung, The Physical Basic of Radiotheraphy, The Ontario Cancer Institute, 1990. 4. Harald Paganetti, Proton therapy physics, CRC Press, 2011

NTE10117 - Tour for Nuclear Technique

Module designation	**Tour for Nuclear Technique**
Semester(s) in which the module is taught	7th semester
Person responsible for the module	Dr. VO Hoang Nguyen
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, lab work
Workload (incl. contact hours, self-study hours)	120 Hours Contact hours: Lectures: 60 hours *(in class)* Private study: 60 hours *(self-study)*
Credit points	2 Credits/ 4 ECTS
Required and recommended prerequisites for joining the module	Radiation Measurement and Detection Methods, Nuclear Safety and Dosimetry Statistical Analysis for Experimental Data in Nuclear Physics
Module objectives/intended learning outcomes	This module provides students with an understanding of nuclear experiment methods such as radiation measurement, neutron activation analysis and Radiography. Students who complete this module could be achieved the following: *- Knowledge: Apply knowledge of nuclear physics such as interaction of radiation with matter, nuclear instruments and NAA analysis methods in sample measurement, experimental setup.* *- Skills: lifelong self-study, practice and conduct experiments.* *- Competences: teamwork, and effective communication in science, analyze and evaluate experimental results.* *- Attitude and ethics: professional ethics, and professional responsibility.*
Content	This module includes the following topics: 1 Introduction training center of Dalat Nuclear Research Institute 2 Experiment of radiation protection 3 Experimental measurement with dosimeter and

	personal dosimeter 4 Thickness gauges measurement 5 Experiment of neutron activation analysis methods 6 Radiography
Examination forms	Individual report
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:** 1. Training center, (2015), Twenty-seven experiment of nuclear techniques, Dalat Nuclear Research Institute **References:** 1. G.L Knoll (2011), Radiation detection and measurement, 4th, John Willey & Sons, Ins. 2. G.D. Chase, S. Rituper, J.W. Sulcoski (1964), Experiments in nuclear science, 2nd, Alpha edition. 3. J. L. Ducan (1988), Laboratory investigation in nuclear science, Oak Rigde TN USA.

NTE10118 - Particle Physics

Module designation	**Particle Physics**
Semester(s) in which the module is taught	7th semester
Person responsible for the module	Prof. CHAU Van Tao
Language	Vietnamese
Relation to curriculum	Elective
Teaching methods	Lecture, lesson, exercise...
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	Quantum mechanics, relative mechanics
Module objectives/intended learning outcomes	This module covers the following topics: Conservation principles- Interaction characteristics of leptons, muons, mesons, stranges, etc. Unitary symmetry of the strong interaction-Weak interaction -Quarks and gluons, chromodynamics. Students who complete this module could be achieved the following: *- Knowledge: Be able to understand and apply knowledge of particle physics in science and life.* *- Skills: Be able to work in individual, group work, self-study, lifelong learning, and problem solving.* *- Competences: Be able to design a simple experiment involving particle physics. Have the capacity to learning in the next periods.*
Content	This module includes the following topics: 1. Conservation principles 2. Interaction characteristics of leptons, muons, mesons, Strange particle 3. Pions 4. Resonance particles 5. Unitary symmetry of the strong interaction 6. Quarks and gluons, chromodynamics

Examination forms	Midterm and Final test: essay test
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 orequal to 5.0/10.0.
Reading list	Main books: 1. K.N. Mukhin, Experimental Physics, vol II Mir Publisher, Moscow, 1987 2. I.K. Yodin, Nuclear Physics, Mir Publisher, Moscow, 1982 3. Ronald Gautreau, Modern Physics, Education Publisher, 1998 4. Dao Tien Khoa, Modern Nuclear Physics, Science & Technology Publisher, 2010 5. Jean-Louis Basdevant, James Rich, Fundamentals in Nuclear Physics From nuclear structure to cosmology, Springer Science, 2005 6. Yung–Kuo-Lim, Problems and Solutions of atomic, nuclear and particle physics, World Scientific, 2000 7. A.G Sitenko, Theory of Nuclear Reactions, World Scientific, 1990

NTE10201 - Nuclear Reactor Thermal Hydraulics

Module designation	**Nuclear Reactor Thermal Hydraulics**
Semester(s) in which the module is taught	6th Semester
Person responsible for the module	Dr. PHAN Le Hoang Sang
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, exescise…
Workload (incl. contact hours, self-study hours)	180 Hours Contact hours: Lectures: 45 hours *(in class)* Private study: 135 hours *(self-study)*
Credit points	3 Credits/ 4.5 ECTS
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	This module provides knowledge of thermal hydraulics in nuclear reactors, including fluid flow, heat transfer, and safety analysis. Students who complete this module could be achieved the following outcomes: - Knowledge: Understand the principles of thermal hydraulics in nuclear reactor design. - Skills: Develop the ability to analyze thermal hydraulic systems and perform calculations. - Competences: Be able to apply thermal hydraulic concepts to reactor safety and operational efficiency. - Attitude and Ethics: Recognize the importance of safety and ethical standards in nuclear engineering.

Content	This module includes the following topics: 1. Introduction to thermal hydraulics 2. Basic principles of fluid mechanics 3. Heat transfer mechanisms in reactors 4. Reactor coolant systems 5. Thermal-hydraulic analysis methods 6. Safety analysis and emergency cooling systems 7. Computational fluid dynamics (CFD) 8. Case studies in thermal hydraulics
Examination forms	Written examination, group project, report
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:** 1. John R. McGhee (2015). Thermal Hydraulics in Nuclear Reactor Engineering. Springer. 2. John R. Lamarsh (2001). Introduction to Nuclear Reactor Theory. Addison-Wesley Publishing Company, New York, USA. 3. Huynh Truc Phuong (2016). Nuclear Reactor Physics. VNUHCM Publishing House, Vietnam. **References:** 1. F. P. Incropera & D. P. DeWitt (2011). Fundamentals of Heat and Mass Transfer. Wiley. 2. R. E. Meyer (2002). Thermal-Hydraulics of Nuclear Reactors. CRC Press. 3. B. A. E. Neves (2010). Computational Thermal Hydraulics. Academic Press..

NTE10202 - Nuclear Safety

Module designation	**Nuclear Safety**
Semester(s) in which the module is taught	7th Semester
Person responsible for the module	Prof. CHAU Van Tao
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, exescise…
Workload (incl. contact hours, self-study hours)	135 Hours Contact hours: Lectures: 15 hours (in class) Exercise: 30 hours Private study: 90 hours (self-study)
Credit points	2 Credits/ 3.5 ECTS
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	Students who complete this module could be achieved the following outcomes: - Knowledge: + Catagorizing of nuclear safety problems, safety level in nuclear safety systems of nuclear power plant and + Calculating of radiation effects and computing of exposure and doses. - Skills: Be able to work in individual, group work, self-study, lifelong learning, and problem solving. - Competences: Be able to design a simple experiment involving estimation of radiation doses. Have the capacity to learn in the next periods.
Content	This module includes the following topics: 1. Basic concepts and units for radiological, nuclear and process safety 2. Interaction of radiation with matter 3. Biological effects of radiation 4. Radiation safety Guides 5. Evaluation for radiation protection 6. Measurements of dosimetry based on ionization

	7. Measurements of dosimetry based on luminescence 8. The basic principles of film badge dosimetry 9. Neutron dosimetry
Examination forms	Midterm test and Final test: essay
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:** 1. Chau Van Tao (2004). Ionizing radiation safety. VNUHCM Publishing House, Vietnam. 2. Chau Van Tao (2005). Ionizing radiation dose. VNUHCM Publishing House, Vietnam. **References:** 1. K. N. Mukhin (1987). Experimental nuclear physics. Mir Publishers, Russia. 2. H. Cember (1996). Introduction to Health Physics Third Edition. McGraw-hill, United Kingdom. 3. W. N. Cottingham, D.A. Greenwood (2001). Introduction to atomic and nuclear physics. Second edition. Cambridge University Press, United Kingdom.

NTE10203 - Nuclear Power Plant Simulators

Module designation	Nuclear Power Plant Simulators
Semester(s) in which the module is taught	7th Semester
Person responsible for the module	Dr. PHAN Le Hoang Sang
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, practical exercises, simulation labs, group projects
Workload (incl. contact hours, self-study hours)	150 Hours Contact hours: Lectures: 0 hours *(in class),* practical: 60 hours (in class) Private study: 90 hours *(self-study)*
Credit points	2 Credits/ 4 ECTS
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	This module provides knowledge of the operational aspects of nuclear power plants, focusing on simulation techniques, system dynamics, and performance assessment. Students who complete this module could be achieved the following outcomes: - Knowledge: Understand and apply concepts related to the simulation of nuclear power plant operations. - Skills: Develop skills in using simulation software, data analysis, and problem solving. - Competences: Ability to model and simulate various operational scenarios and assess performance metrics. - Attitude and Ethics: Foster a sense of responsibility and ethical considerations in the operation of nuclear facilities.

Content	This module includes the following topics: 1. Introduction to nuclear power plant operations 2. Basics of thermal hydraulics 3. Simulation software tools and techniques 4. System dynamics and transient analysis 5. Fuel cycle management and thermal limits 6. Safety analysis and risk assessment 7. Case studies in nuclear power plant operations 8. Performance evaluation metrics
Examination forms	Practical simulations, project reports, presentations
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: 1. John R. McGhee (2015). Thermal Hydraulics in Nuclear Reactor Engineering. Springer. 2. John R. Lamarsh (2001). Introduction to Nuclear Reactor Theory. Addison-Wesley Publishing Company, New York, USA. 3. Huynh Truc Phuong (2016). Nuclear Reactor Physics. VNUHCM Publishing House, Vietnam. References: 1. F. P. Incropera & D. P. DeWitt (2011). Fundamentals of Heat and Mass Transfer. Wiley. 2. R. E. Meyer (2002). Thermal-Hydraulics of Nuclear Reactors. CRC Press. 3. B. A. E. Neves (2010). Computational Thermal Hydraulics. Academic Press..

NTE10204 - Advanced Practice in Nuclear Energy

Module designation	**Advanced Practice in Nuclear Energy**
Semester(s) in which the module is taught	7th semester
Person responsible for the module	Dr. PHAN Le Hoang Sang
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, lab work
Workload (incl. contact hours, self-study hours)	120 Hours Contact hours: laboratory: 60 hours (in class) Private study: 60 hours (self-study)
Credit points	2 Credits/ 4 ECTS
Required and recommended prerequisites for joining the module	Radiation Measurement and Detection Methods, Nuclear Safety and Dosimetry Statistical Analysis for Experimental Data in Nuclear Neutron Physics and Nuclear Reactor Reactor Thermal Hydraulics
Module objectives/intended learning outcomes	This module provides students with an understanding of nuclear experiment methods such as reactor operation, radiation measurement, neutron activation analysis, neutron flux measurement and criticality measurement. Students who complete this module could be achieved the following: - Knowledge: Apply principles of reactor physics, reactor kinetics, and safety systems in experimental setups. - Skills: Conduct experiments, analyze data, and operate reactor systems safely. - Competences: Collaborate effectively in teams, communicate findings, and evaluate experimental results. - Attitude and ethics: Uphold professional ethics and responsibility in nuclear research.
Content	This module includes the following topics: 1. Neutron flux measurement 2. Fuel Cladding Temperature Measurement 3. Control Rod Calibration Experiment 4. Reaction Rate Measurement

	5. Approach to Criticality Experiment 6. Experiment of neutron activation analysis methods 7. Experimental measurement with neutron and gamma dosimeter and personal dosimeter
Examination forms	Individual report, Practice test
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:** 1. Training center (2015). Twenty-seven experiment of nuclear techniques. Dalat Nuclear Research Institute 2. Tsuyoshi Misawa, Hironobu Unesaki, Cheolho Pyeon (2010). Nuclear Reactor Physics Experiments. Kyoto University Press 3. Genichiro Wakabayashi, Takahiro Yamada, Tomohiro Endo, Cheol Ho Pyeon (2023). Introduction to Nuclear Reactor Experiments. Springer. **References:** 1. G.L Knoll (2001). Radiation detection and measurement. Third edition. John Wiley & Sons, Ins. 2. G.D. Chase, S. Rituper, J.W. Sulcoski (1964). Experiments in nuclear science. 2nd, Aplha editon. 3. J.L. Ducan (1988). Laboratory investigation in nuclear science. Oak Ridge TN, USA.

NTE10205 - Nuclear Fuel Cycle and Radiochemistry

Module designation	**Nuclear Fuel Cycle and Radiochemistry**
Semester(s) in which the module is taught	7th semester
Person responsible for the module	Dr. VO Hong Hai
Language	Vietnamese
Relation to curriculum	Elective
Teaching methods	Lecture, lesson, exercise...
Workload (incl. contact hours, self-study hours)	105 Hours Contact hours: Lectures: 45 hours (in class) Private study: 60 hours (self-study)
Credit points	3 Credits / 4.5 ECTS
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	This module provides students with knowledge of the processes and fuel cycles used in nuclear reactors, from extraction to waste disposal. The course covers the classification of radioactive waste types and transportation. Additionally, it presents fundamental and in-depth principles of radioactive waste disposal. Students who complete this module could be achieved the following: - Knowledge: Understand the processes and technologies involved in the nuclear fuel cycle and the principles of radiochemistry. - Skills: Conduct laboratory experiments, perform radiochemical analyses, and engage in critical thinking and problem-solving. - Competences: Work effectively in teams, communicate scientific ideas clearly, and analyze experimental data. - Attitude and ethics: Develop a sense of professional responsibility and awareness of safety in handling radioactive materials.
Content	This module includes the following topics: 1. Introduction to the nuclear fuel cycle 2. Uranium mining and milling 3. Enrichment processes

	4. Fuel fabrication techniques 5. Reactor operation and fuel management 6. Waste management and disposal strategies 7. Principles of radiochemistry 8. Radiochemical analysis methods 9. Safety protocols in handling radioactive materials
Examination forms	Homework, Midterm: seminar and Final test: oral test
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 orequal to 5.0/10.0.
Reading list	**Main books:** 1. P. D. Wilson (1996). The Nuclear Fuel Cycle: From Ore to Waste. Oxford Science Publication. **References:** 1. John R. Lamarsh (2001). Introduction to Nuclear Engineering. Prentice Hall, New York. 2. Châu Văn Tạo (2004). An toàn bức xạ ion hóa. NXB Đại học Quốc gia TpHCM. 3. Châu Văn Tạo (2005). Liều lượng bức xạ ion hóa. NXB Đại học Quốc gia TpHCM. 4. IAEA (2008). Spent Fuel Reprocessing Options. IAEA-TECDOC-1587.

NTE10301 - Radiobiology for the Radiologist

Module designation	Radiobiology for the Radiologist
Semester(s) in which the module is taught	5th Semester
Person responsible for the module	Dr. Nguyen Thi Cam Thu
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, exercise,…
Workload (incl. contact hours, self-study hours)	90 Hours Contact hours: Lectures: 30 hours *(in class)* Practice: 0 hours Private study: 60 hours *(self-study)*
Credit points	2 Credits/ 3 ECTS
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	This module provides foundational knowledge of the physics, chemistry, and biology involved in the absorption of ionizing radiation. It begins with an introduction to the fundamental principles of physics related to the absorption of both electromagnetic and particle radiation in matter. It then explores the basic chemistry, focusing on the interactions between radiation and the molecules within living organisms, as well as interactions among substances within these organisms. Following the physical and chemical processes, the course delves into biological processes, detailing the effects of radiation on living organisms, including cellular damage, DNA damage, and the mechanisms for self-repair. The course also highlights the beneficial uses of ionizing radiation in tumor radiotherapy, as well as the potential harm to healthy tissues. An introduction to the radiobiological aspects of radiation safety is provided. The final part of the course covers radiobiological models and their applications in adjusting treatment regimens or dose compensation during radiotherapy. Students who complete this module could achieve:

	Knowledge: application of fundamental and in-depth knowledge of radiobiology, mathematical formulations in radiotherapy and radiation protection. *- Skills: teamwork, logical thinking and lifelong learning* *- Competences: ability to apply physics knowledge and experience to conceptualize and design new physical situations.* *- Attitude and ethics: Emphasis on professional ethics and responsibility, particularly in contexts involving cancer patients*
Content	This module includes the following topics: 1. Physics and chemistry of radiation interactions with matter 2. Molecular and cellular radiobiology 3. Tumour radiotherapy 4. Normal tissue response to radiotherapy 5. Radiobiological basis of radiation protection 6. Linear Quadratic Model
Examination forms	Midterm test: seminar presentation Final test: essay
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	1. IAEA (2010), Radiation biology: a handbook for teachers and students, Austria 2. Eric J. Hall, Amato J. Giaccia (2019), Radiobiology for the Radiologist, Wolters Kluwer, USA 3. Michael C Joiner, Albert J van der Kogel (2019), Basic Clinical Radiobiology, CRC Press, USA

NTE10302 - Anatomy and Physiology

Module designation	**Anatomy and Physiology**
Semester(s) in which the module is taught	5th Semester
Person responsible for the module	Dr. Phan Ngoc Tien
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson
Workload (incl. contact hours, self-study hours)	90 Hours Contact hours: Lectures: 30 hours *(in class)* Practice: 0 hours Private study: 60 hours *(self-study)*
Credit points	2 Credits/ 3 ECTS
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	Students could achieve the following outcomes as below: - *Knowledge*: Describe the structure and function of the human body at molecular, cellular, tissue, organ, and system levels; explain the physiological mechanisms that underpin human health and disease; identify the relationships and interactions between different body systems - *Skills*: perform anatomical dissections with accuracy and safety, apply anatomical and physiological knowledge to solve clinical problems, communicate scientific information clearly and effectively in both oral and written forms. - *Competences*: Integrate knowledge from various disciplines to understand complex biological systems, critically assess scientific literature and research findings related to anatomy and physiology - *Attitude and ethics*: professional ethics, and professional responsibility.

Content	This module includes the following topics: 1. Introduction to Human Anatomy and Physiology 2. Cells and Tissues 3. Integumentary System 4. Skeletal System 5. Muscular System 6. Nervous System 7. Cardiovascular and Lymphatic Systems 8. Respiratory and Digestive Systems
Examination forms	Midterm test and Final test: essay
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	4. Marieb, E. N., & Hoehn, K. (2018). *Human Anatomy & Physiology* (11th ed.), Pearson 5. Tortora, G. J., & Derrickson, B. (2017). *Principles of Anatomy and Physiology* (15th ed.), Wiley 6. Drake, R. L., Vogl, W., & Mitchell, A. W. M. (2020). *Gray's Anatomy for Students* (4th ed.). Elsevier.

MPH10108 - Physics of Radiotherapy

Module designation	**Physics of Radiotherapy**
Semester(s) in which the module is taught	6th Semester
Person responsible for the module	Dr. Nguyen Thi Cam Thu
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, exercise…
Workload (incl. contact hours, self-study hours)	165 Hours Contact hours: Lectures: 45 hours (in class) Practice: 30 hours (in hospital) Private study: 90 hours (self-study)
Credit points	4 Credits/ 6.5 ECTS
Required and recommended prerequisites for joining the module	No
Module objectives/intended learning outcomes	This module provides fundamental and advanced knowledge in the physics of radiation therapy. The main contents of the course consist of Basic radiation physics, Dosimetric principles, Equipment in external radiation therapy, External photon beams, Treatment planning using photon beams, External electron beams, Quality Assurance in Radiation therapy, etc. Moreover, the practice during the course helps the students use their gained knowledge efficiently. Building of strict and careful attitude, the ability to work in detail for students is also focused on the course because the subject is related to cancer patients. Students who complete this module could achieve the following: - Knowledge: application of fundamental and in-depth knowledge of physics, mathematical formulations and trentment planning skills in radiotherapy. - Skills: teamwork, logical thinking and lifelong learning - Competences: ability to apply physics knowledge and experience to conceptualize and design new physical situations. - Attitude and ethics: Emphasis on professional ethics

	and responsibility, particularly in contexts involving cancer patients
Content	This module includes the following topics: 1. Basic Radiation Physics 2. Dosimetric Principles and Dose Measurements 3. Equipment Systems in Radiotherapy 4. Construction and Operation of Linear Accelerators 5. Quality Assurance and Quality Control in Radiation Therapy 6. Radiotherapy Techniques and Treatment Planning Systems 7. Radiation Protection and Safety in Radiotherapy
Examination forms	Midterm test: seminar presentation Final test: essay
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:** 1. E.B.Podgorsak (2006), Radiation Physics for Medical Physicists, Springer, Germany. 2. Faiz M.Khan, Phd, John P.Gibbons, Phd (2014), The Physics of Radiation Therapy, Lippincott Williams & Wilkins, USA 3. Harald Paganetti (2012), Proton Therapy Physics, CRC Press, USA 4. E.B. Podgorsak (2005), Radiation oncology physics: a handbook for teachers and students, IAEA.

MPH10109 - Physics of Nuclear Medicine

Module designation	**Physics of Nuclear Medicine**
Semester(s) in which the module is taught	6th semester
Person responsible for the module	Dr. Hoang Thi Kieu Trang
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, exercise...
Workload (incl. contact hours, self-study hours)	150 Hours Contact hours: Lectures: 30 hours, Labwork: 30 *(in class)* Private study: 90 hours *(self-study)*
Credit points	3 Credits/ 5 ECTS
Required and recommended prerequisites for joining the module	General Nuclear Physics Physics of Radioactivity Method of Radiation Detection and Measurement
Module objectives/intended learning outcomes	This module provides basic knowledge of nuclear medicince imaging systems. Students who complete this module could be achieved the following: *- Knowledge: Be able to apply fundamental and in-depth knowledge of physics, mathematical formulation, and computation in nuclear medicine. Be able to solve fundamental problems in nuclear medicine.* *- Skills: Be able to work in individual, group work, self-study, lifelong learning, and problem solving.* *- Competences: Ability to apply physics knowledge and experience to conceptualize, analyze and design new physical situations.* *- Attitude and ethics: professional ethics, and professional resposibility*
Content	This module includes the following topics: 1. Fundamental physics in nuclear medicine 2. Counting systems 3. Gamma cameras 4. Single photon emission computed tomography 5. Positron emission tomography

	6. Digital image processing in nuclear medicine 7. Internal radiation dosimetry 8. Radiation safety and health physics
Examination forms	Midterm and Final test: Multiple choice test and seminar
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 orequal to 5.0/10.0.
Reading list	Main books: 1. Simon R. Cherry et al,, Physics in Nuclear Medicine 4th ed., CRC Press. 2012. References: 1. Herman Cember, Introduction to Health Physics, 4th ed. CRC Press, 2009.

MPH10110 - Medical Imaging and Image Processing

Module designation	**Medical Imaging and Image Processing**
Semester(s) in which the module is taught	7th semester
Person responsible for the module	Dr. Van Thi Thu Trang
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, exercise...
Workload (incl. contact hours, self-study hours)	165 Hours Contact hours: Lectures: 45 hours *(in class),* pratical: 30 hours Private study: 90 hours *(self-study)*
Credit points	4 Credits/ 6.5 ECTS
Required and recommended prerequisites for joining the module	General Nuclear Physics Physics of Radioactivity Method of Radiation Detection and Measurement
Module objectives/intended learning outcomes	This module provides basic knowledge of medical imaging systems and fundamental digital image processing methods. Students who complete this module could be achieved the following: *- Knowledge: Be able to apply fundamental and in-depth knowledge of physics, mathematical formulation, and computation in medical image processing. Be able to develop simple image processing codes in python or MATLAB.* *- Skills: Be able to work in individual, group work, self-study, lifelong learning, and problem solving.* *- Competences: Ability to apply physics knowledge and experience to conceptualize, analyze and design new physical situations* *- Attitude and ethics: professional ethics, and professional resposibility*
Content	This module includes the following topics: 9. Basics of medical image processing

	10. Digital imaging systems 11. Image Representation 12. Operations in Intensity Space 13. Filtering and Transformations 14. Image reconstruction
Examination forms	Midterm and Final test: essay test
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: 2. Wolfgang Birkfellner, Applied Medical Image Processing, a basic course, CRC Press. 2014. References: 2. Rafael C. Gonzalez, Richard E Woods, Digital Image Processing, Pearson Education International, 2011. 3. David J. Dowsett, Patrick A. Kenny, R.Eugene Joshton, The physics of diagnostic imaging, CRC Press, 2006.

MPH10111 - Fundamental Practice in Medical Physics

Module designation	**Fundamental Practice in Medical Physics**
Semester(s) in which the module is taught	7th semester
Person responsible for the module	Dr. HOANG Thi Kieu Trang
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lecture, lab work
Workload (incl. contact hours, self-study hours)	210 Hours Contact hours: laboratory: 90 hours *(in class)* Private study: 120 hours *(self-study)*
Credit points	3 Credits/ 6 ECTS
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	This module provides students required knowledge and skills to operate, analyze nuclear measurement systems, and ensure radiation safety at medical facilities. It helps students become familiar with basic radiotherapy planning programs, dose calculation, and beam field setup in radiotherapy. Students who complete this module could be achieved the following: *- Knowledge: Apply knowledge of radiation safety in shielding calculations for radiochemistry and apply knowledge of dosage in dose calculations for radiotherapy and diagnostics; Understanding the Physical Principles of Clinical Practice, Nuclear Medicine, and Radiotherapy Techniques.* *- Skills: Acquire career and personal skills such as in individual work, group work, lifelong self-study skills, critical thinking in practice computational and simulation programs in Medical Physics; using specialized English terminology and information technology used in Medical Physics.* *- Competences: Ability in planning, teamwork, and effective communication; Ability to Apply computational and simulation programs in Medical Physics.*

	- Attitude and ethics: Understand radiation safety culture, professional ethics, professional responsibility, and be honest.
Content	This module includes the following topics: 13. Electronic systems in nuclear radiation measurement devices. 14. Application of Genie–2k software in gamma spectrum analysis. 15. Ionizing radiation safety – dose distribution of gamma sources. 16. Medical image restoration and processing. 17. Dose distribution in 3D-CRT and IMRT radiation therapy planning 18. PET imaging using back-projection reconstruction technique 19. Dose compensation calculation for patients with treatment interruptions in radiotherapy
Examination forms	Oral presentation, practice test.
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: 3. Department of Nuclear Physics (2013). Fundamental Practice in Medical Physics. University of Science, VNU-HCM. References: 4. G.L Knoll (2001). Radiation detection and measurement. Third edition. John Wiley & Sons, Ins. 5. Sidney A. Katz, Jeff C.Bryan (2010). Experiments in Nuclear Science. CRC Press. 6. Stefaan Tavernier (2010). Experimental Techniques in Nuclear and Particle Physics. Springer. 7. William R. Leo (1994), Techniques for Nuclear and Particle Physics Experiments. Springer.

MPH10112 - Advanced Practice for Medical Physics

Module designation	Advanced Practice for Medical Physics
Semester(s) in which the module is taught	7th semester
Person responsible for the module	Dr. Hoang Thi Kieu Trang
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lab works
Workload (incl. contact hours, self-study hours)	210 hours Contact hours: Lab works: 90 hours Private study: 120 hours (self-study, lab report)
Credit points	3 Credits/ 6 ECTS
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	This course supplements knowledge and trains practical skills in calculating radiation doses, assessing dose distribution from linear accelerators, medical imaging in nuclear medicine, and evaluating radiation safety. Students who complete this module could be achieved the following: - Knowledge: Be able to apply fundamental and in-depth knowledge of physics, mathematical formulation, and computation in calculating radiation doses, assessing dose distribution from linear accelerators, medical imaging in nuclear medicine, and evaluating radiation safety. - Skills: Be able to work in individual, group work, self-study, lifelong learning, and problem solving. - Competences: Ability to apply physics knowledge and experience to conceptualize, analyze and design new physical situations - Attitude and ethics: professional ethics, and professional resposibility

Content	This module includes the following topics: 1. Applying SPSS software to process data in medical physics 2. Time-coincidence measurements using two detectors 3. Assessing the impact of natural gamma radiation exposure from soil on public health 4. Decontaminating medical equipment contaminated with radioactive substances 5. Radiation particle tracking using Timepix detector 6. Image edging and segmentation 7. PET image reconstruction
Examination forms	Midterm and Final test: lab reports
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 orequal to 5.0/10.0.*e*
Reading list	Main books: - Hoàng Thị Kiều Trang, Nguyễn Thị Cẩm Thu, Nguyễn Duy Thông, Võ Hồng Hải, Lê Công Hảo, Trương Thị Hồng Loan, Văn Thị Thu Trang, Nguyễn Trí Toàn Phúc, Lê Hoàng Minh, Phan Lê Hoàng Sang*, Hands-On Exercises in Medical Physics*, VNU-HCM press, 2024.

NTE10980 - Nuclear Engineering

Module designation	**Nuclear Engineering**
Semester(s) in which the module is taught	8th Semester
Person responsible for the module	Assoc. Prof. TRAN Thien Thanh
Language	Vietnamese
Relation to curriculum	Compulsory course
Teaching methods	Lectures, group discussions, problem-solving exercises, and individual assignments.
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	Nuclear Physics
Module objectives/intended learning outcomes	Upon successful completion of this module, students will be able to: Knowledge - Explain the interactions of ionizing radiation (α, β, γ, neutron) with matter. - Understand the applications of nuclear techniques in fields such as medicine, agriculture, and industry. Skills - Use personal dosimeters and measure radiation doses. - Calculate radiation doses, shielding material thickness, and apply shielding formulas. Competencies - Develop presentation skills. - Improve foreign language proficiency for academic and technical purposes. - Enhance self-directed learning abilities.

Content	This module focuses on the principles of nuclear engineering, radiation interaction with matter, radiation applications in various fields, and radiation safety measures.. This module covers the following topics: 1. Interactions of Ionizing Radiation with Matter: • Fundamental concepts of radiation interaction with matter. 2. Applications of Nuclear Techniques: • Applications in medicine, agriculture, biology, and industry. 3. Radiation Safety and Dosimetry: • Radiation shielding calculations, dose measurement techniques, and safety regulations. 4. Nuclear Reactors and Power Plants: • Principles of nuclear energy generation and operation of nuclear power plants. 5. Presentation and Communication Skills Development: • Practice in academic and professional presentations.
Examination forms	• Individual Assignment: Solve problems related to radiation interaction and safety. • Midterm Assessment: Multiple-choice and problem-solving test. • Final Assessment: Written exam with theoretical and calculation-based tasks.
Study and examination requirements	• Minimum Attendance Requirement: 80% attendance for lectures and practical sessions. • Final Score Requirement: A score of 5.0/10.0 or higher is required to pass the module.
Reading list	Main Books and Resources: 9. Châu Văn Tạo (2004), *An toàn bức xạ ion hóa*, NXB ĐHQG-HCM. 10. Huỳnh Trúc Phương, Trần Phong Dũng, Châu Văn Tạo (2015), *Các phương pháp phân tích hạt nhân*, NXB ĐHQG-HCM.

	11. Ngô Quang Huy (2007), *Vật lý lò phản ứng hạt nhân*, NXB ĐHQG-HN. Supplementary Resources: • Glenn F. Knoll (1989), *Radiation Detection and Measurement*, John Wiley & Sons. • Herman Cember (1996), *Health Physics*, McGraw-Hill. • Ngô Quang Huy (2004), *An toàn bức xạ ion hóa*, NXB Khoa học và Kỹ thuật.

NTE10981 - Problems Simulation in Nuclear Engineering

Module designation	**Problems Simulation in Nuclear Engineering**
Semester(s) in which the module is taught	8th Semester
Person responsible for the module	Assoc. Prof. TRUONG Thi Hong Loan
Language	Vietnamese
Relation to curriculum	Compulsory course
Teaching methods	Lectures, group discussions, problem-solving exercises, and individual assignments.
Workload (incl. contact hours, self-study hours)	180 hours Contact hours: Lectures: 30 hours *(in class)* Practical: 30 hours *(in class)* Private study: 120 hours *(self-study)*
Credit points	3 Credits / 5 ECTS
Required and recommended prerequisites for joining the module	Basic Informatics, Nuclear Physics
Module objectives/intended learning outcomes	This module provides students with the knowledge of programming languages (Matlab) and their application in solving numerical problems and simulating physical and nuclear physics problems. It also introduces two widely-used simulation software tools, MCNP and Geant4, for solving nuclear engineering problems and conducting experiments. Upon successful completion of this module, students will be able to: Knowledge - Understand basic programming syntax in Matlab and C/C++. - Develop simple Matlab programs with graphical user interfaces. - Apply Matlab to solve physics and nuclear physics problems. - Use input file syntax for MCNP software. - Apply Geant4 program syntax.

	Skills - Develop nuclear experiment simulation problems using MCNP. - Develop nuclear experiment simulation problems using Geant4. - Master programming skills. Competencies - Analyze and approach problem-solving effectively. - Demonstrate creativity and logical thinking skills. - Read and use English technical terms fluently. - Exhibit self-learning and knowledge-updating abilities. - Collaborate effectively in team settings.
Content	This module covers the following topics: 6. Matlab Programming Language: • Variables, functions, matrices, vectors, operations, and loops. • Data structures: cell arrays, strings, and structured arrays. • File handling and graphical user interface (GUI) design. 7. Numerical Methods in Matlab: • Differential and integral numerical methods. • Toolboxes for optimization and statistics. 8. MCNP Software: • Introduction to MCNP: Installation and input file structure. • Geometry and tally definition in MCNP. • Analyzing MCNP output files. 9. Geant4 Software: • Introduction to Geant4: Installation and program structure. • Defining material and geometry in Geant4. • Simulating nuclear detectors and analyzing energy resolution effects.

Examination forms	• Homework: Exercises on Matlab and nuclear problems. • Group Projects: Simulation projects using MCNP/Geant4.
Study and examination requirements	• Attendance: Students are allowed a maximum of 3 absences from lectures. • Academic Integrity: Cheating in assignments or exams will result in disciplinary actions and a grade of 0 for the course. • Collaboration: Group activities are essential; active participation is required. • Final Score Requirement: A score of 5.0/10.0 or higher is required to pass the module.
Reading list	Main Books and Resources: 12. Matlab User Guide 13. MCNP User Guide 14. Geant4 User Guide