

VIETNAM NATIONAL UNIVERSITY HOCHIMINH CITY

UNIVERSITY OF TECHNOLOGY



MODULE HANDBOOK

Faculty of Environment and Natural Resources

ENVIRONMENTAL ENGINEERING PROGRAMME

Ho Chi Minh City, 2022

I. Module Handbooks for General Subjects

1.1 Mathematics & Natural Sciences Subjects

Calculus 1

MT1005

Module designation	<i>Calculus 1</i>
Semester(s) in which the module is taught	<i>1</i>
Person responsible for the module	<i>Dr. Tran Ngoc Diem</i>
Language	<i>Vietnamese</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, lesson, project.</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload: Contact hours (lecture, exercise): 65 Private study including examination preparation, specified in hours¹: 115</i>
Credit points	<i>4</i>
Required and recommended prerequisites for joining the module	<i>None</i>
Module objectives/intended learning outcomes	<i>Upon completion of this course, students know how to:</i> <ul style="list-style-type: none"><i>– Be able to recall definitions, properties, methods of calculating derivatives and integrals of single variable functions and ordinary differential equations.</i><i>– Apply theory to solve practical problems.</i><i>– Be able to work in groups</i>

Content	<p><i>Part 1: Theory of differentiation and integration of functions of one variable and their applications</i></p> <p><i>Part 2: Ordinary differential equations and their applications.</i></p>
Exams and assessment formats	<ul style="list-style-type: none"> – <i>Quizzes.</i> – <i>One midterm test (50 minutes).</i> – <i>One project.</i> – <i>One final exam (100 minutes).</i>
Study and examination requirements	<p><i>Requirements for successfully passing the module</i></p> <p><i>The final grade in the course is composed of 50% performance on exams, 5% quizzes, 25% midterm test, 20% project. Students must have a final grade of 50% (5/10) or higher to pass</i></p>
Reading list	<ul style="list-style-type: none"> – <i>Calculus 1, Nguyen Dinh Huy (Main author), Viet Nam National University, HCM City 2016 (in Vietnamese).</i> – <i>Calculus early transcendentals. James Stewart , 7e, Thomson Brooks Cole 2008.</i> – <i>Applied Cacculus for managerial, life and social sciences_brief approach – Soo T.Tan – Brooks Cole-Cengage learning 2008.</i>

¹ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Module designation	<i>Calculus 2</i>
Semester(s) in which the module is taught	2
Person responsible for the module	<i>Dr. Nguyen Quoc Lan</i>
Language	<i>Vietnamese</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, lesson, project.</i>
Workload (incl. contact hours, self-study hours)	<p><i>(Estimated) Total workload:</i></p> <p><i>Contact hours: 65</i></p> <p><i>Private study including examination preparation, specified in hours¹: 115</i></p>
Credit points	4
Required and recommended prerequisites for joining the module	<i>None ...</i>
Module objectives/intended learning outcomes	<p><i>Upon completion of this course, students know how to:</i></p> <ul style="list-style-type: none"> <i>– Be able to recall definitions, properties, methods of calculating derivatives and integrals of multivariable functions and series.</i> <i>– Apply theory to solve practical problems.</i> <i>– Be able to work in groups</i>
Content	<p><i>Part 1: Theory of differentiation and integration of multivariable functions and their applications.</i></p> <p><i>Part 2: Theory of number series and power series.</i></p>

Exams and assessment formats	<ul style="list-style-type: none"> – <i>Quizzes.</i> – <i>One midterm test (50 minutes).</i> – <i>One project.</i> – <i>One final exam (100 minutes).</i>
Study and examination requirements	<p><i>Requirements for successfully passing the module</i></p> <p><i>The final grade in the course is composed of 50% performance on exams, 5% quizzes, 25% midterm test, 20% project. Students must have a final grade of 50% (5/10) or higher to pass</i></p>
Reading list	<ul style="list-style-type: none"> – <i>Calculus 2, Nguyen Dinh Huy (Main author), Viet Nam National University, HCM City 2016 (in Vietnamese).</i> – <i>Calculus early transcendentals. James Stewart, 7e, Thomson Brooks Cole 2008.</i> – <i>Applied Cacculus for managerial, life and social sciences_brief approach – Soo T.Tan – Brooks Cole-Cengage learning 2008.</i>

¹ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Engineering Drawing

Module designation	<i>Engineering Drawing</i>
Semester (s) in which the module is taught	<i>1/2/3</i>
Person responsible for the module	<i>Nguyen Thi Kim Uyen</i>
Language	<i>Vietnamese</i>
Relation to curriculum	<i>Compulsory</i> <i>Compulsory / elective / specialisation</i> <i>Names of other study programmes with which the module is shared</i>
Teaching methods	<i>- Lecture</i> <i>- Exercise</i> <i>- Experiment</i> <i>e.g. lecture, lesson, lab works, project, seminar, etc.</i>
Workload (incl. contact hours, self-study hours)	<ul style="list-style-type: none"> - <i>Theory: 30 hours</i> - <i>Practice: 10 hours</i> - <i>Experiment: 20 hours</i> - <i>Selt-study: 85 hours (Estimated) Total workload: 145 hour</i> <i>Contact hours (please specify whether lecture, exercise, laboratory session, etc.):</i> <i>Private study including examination preparation, specified in hours⁴:</i>
Credit points	<i>3</i>

Required and recommended prerequisites for joining the module	<p><i>None</i></p> <p><i>E.g. Algebra 101...</i></p> <p><i>E.g. existing competences in ...</i></p>
Module objectives/intended learning outcomes	<ul style="list-style-type: none"> - <i>Students know how to use drawing equipment and AutoCAD software.</i> - <i>Students are able to understand technical ideas on the technical scheme and know the way to construct the drawing representations according to TCVN and ISO.</i> - <i>Understanding the orthographic projection method in representing the basic geometrical features.</i> - <i>Students know how to show the representations of screwthread, keys, pins, the technical requirements of assembly drawings and detail drawings; construct and understand the assembly drawing, draw the detail drawing.</i>

Module designation	<i>Fluid Mechanics (Code CI2003)</i>
Semester (s) in which the module is taught	<i>3th or 4th</i>
Person responsible for the module	<i>Ass.Prof. Giang Le Song.</i>
Language	<i>Vietnamese, English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, lesson, lab works</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 95 (Estimated)</i> <i>Contact hours:</i> <i>- lecture: 30</i> <i>- exercise: 15</i> <i>- laboratory work: 20</i> <i>Private study including examination preparation, specified in hours¹: 30</i>
Credit points	<i>3</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended Learning outcomes	<i>Fluid Mechanics is a fundamentally engineering course for all engineering students. The course with the code</i>

¹ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

	<p><i>CI2003 is designed for faculties Mechanical Engineering, Applied Sciences, Geology & Petroleum Engineering, Transportation Engineering, Civil Engineering and Environment and Natural Resources. The aim of the course is to equip students two blocks of knowledge such as fundamental and practical of Fluid Mechanics. Fundamental knowledge block is phenomena with governing equations and laws describing the equilibrium and motion of fluid, the interactions between fluid and other bodies. This block of knowledge helps students understand the principles of fluid mechanics and will serve as a background for postgraduate study. Practical knowledge block is methods, equations and formula. This block of knowledge helps students to solve practical problems in engineering fields</i></p>
Content	<p><i>The content of the subject consists of 2 parts. The first part consists of the first 4 chapters: Introduction, Fluid Static, Fluid Kinetics and Fluid Dynamics. In this part, students are mainly equipped with basic knowledge including governing equations, laws describing balance and movement of fluids. The second part consists of the last 4 chapters, which are the chapters Steady flow in a pipe, Uniform flow in an open channel, Two-dimensional potential flow and Boundary layer, drag, lift force. In this part, the governing equations and laws are advanced into practical equations, formulas and computational methods for solving applied problems in engineering fields.</i></p>

Exams and assessment formats	<i>One midterm quiz assessment (50 minutes) and one final quiz exam (90 minutes), short computer-based quizzes, experiment reports</i>
Study and examination requirements	<i>The final grade in the module is composed of 50% performance on exams, 20% midterm quiz, 10% short computer-based quizzes, 20% experiment reports. Students must have a final grade of 50% or higher to pass</i>
Reading list	<p><i>[1] Nguyễn Ngọc Ân, Nguyễn Thị Bửu, Lê Song Giang, Huỳnh Công Hoài, Nguyễn Thị Phương. Giáo trình Cơ Lưu Chất . ĐH Bách Khoa, Năm 1998</i></p> <p><i>[2] Nguyễn Ngọc Ân, Nguyễn Thị Bửu, Nguyễn Khắc Dũng, Lê Song Giang, Huỳnh Công Hoài, Nguyễn Thị Phương, Hồ Xuân Thịnh, Nguyễn Quốc Ý. Bài tập Cơ Lưu Chất. ĐH Bách Khoa, Năm 2011.</i></p> <p><i>[3] Hoàng văn Quý và Nguyễn Cảnh Cầm. Thủy lực 1. NXB Giáo dục, 1973.</i></p> <p><i>[4] Nguyễn hữu Chí, Nguyễn hữu Dy, Phùng văn Khương, Bài tập Cơ học Chất lỏng ứng dụng. NXB Giáo Dục 1998</i></p> <p><i>[5] Bruce R. Munson, Donald F.bYoung, Theodore H.Okiishi. E-book: Fundamentals of fluid mechanics. John Wiley & Sons Inc. 2006</i></p> <p><i>[6] Subramanya.K. Theory and application of fluid mechanics. Mc.Graw - Hill 1993</i></p>

Module Handbook for the Course on Climate Change (EN3087)

Module designation	<i>Climate Change (EN3087)</i>
Semester(s) in which the module is taught	<i>1 and 2 (this is an elective course, and the semester to be delivered depending on student's enrolment)</i>
Person responsible for the module	<i>Associate Professor Vo Le Phu; Dr. Ha Quang Khai</i>
Language	<i>Vietnamese and English</i>
Relation to curriculum	<i>Specialisation Environmental Engineering</i>
Teaching methods	<i>Lecture, documentary films, in-class exercises, group discussion/ presentation.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 51 hours Contact hours: 3 hrs/week Private study including examination preparation, specified in hours: 20 hrs</i>
Credit points	<i>3</i>
Required and recommended prerequisites for joining the module	<ul style="list-style-type: none"> - <i>Pre-requisite course: N/A</i> - <i>Pre-course: Environmental Law and Policy (EN2025)</i> - <i>Parallel courses: Water Resources Management (EN3039); Coastal Zone Management (EN3045); Green Technology (EN4015); Forestry Management & Biodiversity (EN4013)</i>

Module objectives/intended learning outcomes	<p><i>Upon the completion of this course, students are able to achieve the following knowledge and skills:</i></p> <ul style="list-style-type: none"> - <i>Knowledge: Understand what is climate change and climate-related risks; causes and effects of climate change.</i> - <i>Skills: Students are able to apply theoretical knowledge for analysing impacts of climate change on natural resources and the environments.</i> - <i>Comptences: Identify countermeasures for climate change adaptation and mitigation at both global and local levels to meet the goal of sustainable development.</i>
Content	<p><i>The purpose of this course is to provide students with basic knowledge of the science of the Earth's climate system, driving forces of climate change, challenges and opportunities of climate change, effects of climate change on global natural resources and environments, and human's responding measures for climate change impacts.</i></p>

Exams and assessment formats	<ul style="list-style-type: none"> - <i>One (01) Individual Essay (take-home written assignment): students work in 6 week and submit in week 7 or 8 of the course.</i> - <i>One (01) Group Works: each group consists of 4-5 students, choose their own topic from week 2. Group presentation in week 7 for about 30 minutes. Assessment of each group is based on an agreed rubric.</i> - <i>One (01) Final Exam: quizzes-based and open questions</i>
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<p>Study and examination requirements</p>	<ul style="list-style-type: none"> - <i>All materials (lecture handouts, article papers, reports and case studies) are provided on BK-elearning (BkeL).</i> - <i>Students are required to be at least 90% attendance of theoretical lectures and 100% of individual assignments, discussion, presentation of the course.</i> - <i>Students are provided with ideas of individual essay's topics in Week 2 of the course. Individual essays should be submitted in Week 7 or 8. Maximum length of the essay is 2,500 words (excluded tables, diagrams, figures). Specific requirements of essay will be provided in Week 1</i> - <i>Group works presentation will be performed in Week 7 – 10. Assessment Rubrics for group presentation will be discussed in the 1st week of the course.</i> - <i>The final grade includes in-class exercises (20%); individual essay (20%); group presentation (10%); mid-term exam (20%); and final exam (30%).</i> - <i>Students must have a final grade of 50% or higher to pass the course.</i> - <i>Students must submit individual assignment and must participate group presentation to qualify for entering the final exam.</i>
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Reading list

Textbook and main readings:

[1]. IPCC (2013). *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp.

[2]. IMHEN and UNDP (2015). *Special Report on Disaster Risk Management and Extreme Climate Events in Vietnam for Enhancing Climate Change Adaptation* (in Vietnamese). Publisher of Vietnam Natural Resources – Environment & Mapping, Hanoi.

[3]. Kaya, Y., Yamaji, K., Akimoto, K. (2015). *Climate Change and Energy: Japanese Perspectives on Climate Change Mitigation Strategy*. Imperial College Press, London.

[4]. World Bank (2010). *Climate Risks and Adaptation in Asian Coastal Cities: A Synthesis Report*. World Bank, Washington, DC.

Additional readings:

[5]. UNEP (2009). *Climate Change Science Compendium*. United Nations Environment Programme, Nairobi.

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| | <p>[6]. Dasgupta, S., Laplante, B., Meisner, C., Wheeler, D. and Yan, J. (2007). <i>The Impact of Sea Level Rise on Developing Countries: A Comparative Analysis</i>. World Bank Policy Research Working Paper 4136. World Bank, Washington, DC.</p> <p>[7]. WWF (2009). <i>Mega-Stress for Mega-Cities: A Climate Vulnerability Ranking of Major Coastal Cities in Asia</i>. WWF International, Gland, Switzerland.</p> <p>[8]. Fuchs, R. J. (2010). “<i>Cities at Risk: Asia’s Coastal Cities in an Age of Climate Change</i>”. Analysis from East-West Center. <i>Asia Pacific Issue</i>, 96(2010): 1 – 12.</p> <p>[9]. Bates, B., Kundzewicz, Z.W., Wu, S. and Palutikof, J.P. (eds). (2008). <i>Climate Change and Water</i>. Technical Paper of the Intergovernmental Panel on Climate Change. IPCC Secretariat, Geneva.</p> <p>[10]. Hardy, J.T. (2003). <i>Climate Change: Causes, Effects and Solutions</i>. John Wiley & Sons, Chichester.</p> |
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Module designation	CH1003 - General Chemistry
Semester(s)	1
Responsible Person	003106 – Nguyen Tuan Anh
Language	Vietnamese/English
Relation to curriculum	Compulsory All programs in HCMUT
Teaching methods	Blended Learning, Practice, Active Learning.
Workload (Credit hours)	Total: 155 hours includes: Lecture: 30 hrs; Experiments: 20 hrs; Assignments: 15 hrs; Self-study: 90hrs
Credit points	3 (6 ECTS)
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	L.O.1 Present basic structure of chemicals L.O.2 Calculate thermodynamic quantities and chemical balances L.O.3 Calculate properties of chemical solutions L.O.4 Calculate properties of electrochemical system and redox reactions
Content	Part 1- Matter Structure: This part supplies the modern knowledge on atoms, electronic structure and the periodic law, bonding types in molecules and molecular structure. Part 2- Basic Theories of Chemical Processes: This part supplies basic concept of foundation theories on Chemical Processes:

	<p>Thermochemistry, entropy and Gibbs energy, the concept of chemical equilibrium and factors affecting it, equilibrium types in electrolyte solutions, equilibrium in heterogeneous systems, the direction and extent of non-change oxidation state reactions, the direction and extent of oxidation-reduction reactions, reaction rate and factors affecting it.</p> <p>Part 3 - Laboratory practice: Learn safety rules in the laboratory and practice using some essential tools in the chemical laboratory, the techniques of preparation and titration of solutions, and the calculation of experimental errors. Students perform experiments to verify the theory and evaluate the results for each experiment</p>
Exams and assessment formats	Experiments: 25%; Assignments: 5%; Midterm exam: 20%; Final Exam: 50%
Study and examination requirements	Students must attend in laboratory 100% of class meetings in order to receive credit for the course. Students must submit their projects on time.
Reading list	<p><i>Materials of the subject (lecture slides) can be downloaded from BKEL page (http://e-learning.hcmut.edu.vn/). Students can also use the following documents:</i></p> <p><i>Textbooks:</i></p> <p><i>[1] Nguyễn Đình Soa, Hóa Đại Cương, NXB Đại học Quốc Gia Tp. HCM, 2017.</i></p> <p><i>[2] Huỳnh Kỳ Phương Hạ, Nguyễn Sơn Bạch, Trần Minh Hương, Nguyễn Thị Bạch Tuyết, Nguyễn Minh Kha, Nguyễn Lệ Trúc, Bài tập trắc nghiệm Hóa đại cương, NXB. Đại học quốc gia Tp. HCM, 2016.</i></p> <p><i>References:</i></p>

	<p>[1] Lê Mậu Quyền, <i>Hóa học Đại cương</i>, NXB. Khoa Học và Kỹ Thuật, Hà Nội, 2003.</p> <p>[2] Hoàng Nhâm, <i>Hóa học vô cơ, Tập 1</i>, NXB Giáo dục, Hà Nội, 1994.</p> <p>[3] David W. Oxtoby, H.P. Gillis, Alan Campion, <i>Principles of Modern Chemistry</i>, 8th edition, Thomson Brooks/Cole, 2016.</p> <p>[4] Darrell D. Ebbing and Steven D. Gammon, <i>General Chemistry</i>, 11th edition, Houghton Mifflin Company, New York, 2016.</p> <p>Lucy T.Eubanks, <i>Preparing for your ACS examination in General Chemistry</i>, ACS Chem Ed Exams, 1998.</p>
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Linear Algebra

Course ID: MT1007

Course designation	<i>Linear Algebra</i>
Semester(s) in which the course is taught	<i>1 or 2</i>
Person responsible for the course	<i>Dr. Dang Van Vinh, Msc. Phan Thi Khanh Van</i>
Language	<i>Vietnamese, English</i>
Relation to curriculum	<i>compulsory</i>
Teaching methods	<i>lecture, lesson, project.</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload: 123.5 Contact hours (lecture, exercise): 44 Private study including examination preparation, specified in hours¹: 91</i>
Credit points	3
Required and recommended prerequisites for joining the module	No
Module objectives/intended learning outcomes	<i>Upon completion of this course, students know how to:</i> <ul style="list-style-type: none"><i>- Understand main concept of linear algebra</i><i>- Solve basis problems in linear algebra.</i> <i>State and solve practice problems such as Markov model, Leslie model, Input Output model, Least square problem, ...</i>
Content	<i>The subject provides students with fundamental knowledge:</i> <ul style="list-style-type: none"><i>- Matrix algebra: matrix, determinant, rank, inverse of a square matrix, system of linear equations.</i>

	<ul style="list-style-type: none"> - <i>Vector spaces: Space, subspace, linear independence, basis and dimension</i> - <i>Euclidean space: inner product, orthogonal complement, orthogonal projection, Gram Schmidt process</i> - <i>Linear mapping, Kernel and Image of linear mapping, matrix representation of linear mapping.</i> - <i>Eigenvalues and eigenvectors, diagonalization, orthogonal diagonalization, quadratic form.</i>
Exams and assessment formats	<ul style="list-style-type: none"> - <i>One mid-term test (45 minutes)</i> - <i>Short exercises (in classroom)</i> - <i>One final exam (90 minutes)</i> - <i>Group homework (work in group and give presentation)</i> - <i>Project</i>
Study and examination requirements	<p><i>Requirements for successfully passing the course:</i></p> <p><i>The final grade in the course is composed of 50% performance on final exams, 5% exercises, 20% project, 25% mid-term test. Students must have a final grade of 5.0/10.0 or higher to pass</i></p>
Reading list	<p><i>[1] Dang Van Vinh. Textbook of Linear algebra, VNU HCM, 2020.</i></p> <p><i>[2] Nguyen Tien Dung. Linear algebra. Theory and applications, VNU HCM, 2018.</i></p> <p><i>[3] Strang G. Linear algebra and its applications, 4th edition, Thomson Brook/Cole, 2006.</i></p> <p><i>[4] Steven Leon. Linear Algebra with Applications, 7th Edition,</i></p>

	<p><i>Pearson Prentice Hall, 2006</i></p> <p><i>[5] David C. Lay, Linear Algebra and its applications, Addison -Wesley Publishing Company, New York, 1993.</i></p> <p><i>Howard Anton, Chris Rorrer. Elementary Linear Algebra, application version, 10th edition, John Willey & Sons, 2010.</i></p>
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¹ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be count

Module designation	<i>Probability and Statistics</i>
Semester(s) in which the module is taught	<i>3,4</i>
Person responsible for the module	<i>Dr. Nguyen Tien Dung, Dr. Phan Thi Huong</i>
Language	<i>Vietnamese</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, lesson, project.</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:</i> <i>Contact hours (lecture, exercise): 39</i> <i>Private study including examination preparation, specified in hours¹: 141</i>
Credit points	<i>4</i>
Required and recommended prerequisites for joining the module	<i>None</i>
Module objectives/intended learning outcomes	<i>Upon completion of this course, students know how to:</i> <ul style="list-style-type: none"> – <i>Present definitions and formulas in Probability and Statistics.</i> – <i>Analyze the questions and apply appropriate formulas into solving questions.</i> – <i>Work in groups and present reports effectively.</i>

Content	<p><i>Part 1: Probability</i></p> <p><i>Part 2: Random variables and random vectors</i></p> <p><i>Part 3: Some special distributions</i></p> <p><i>Part 4: Confidence interval</i></p> <p><i>Part 5: Hypothesis testing for 1 and 2 samples</i></p> <p><i>Part 6: Anova</i></p> <p><i>Part 7: Linear regression models</i></p>
Exams and assessment formats	<p><i>Quizzes.</i></p> <p><i>One midterm test (50 minutes).</i></p> <p><i>One project.</i></p> <p><i>One final exam (100 minutes).</i></p>
Study and examination requirements	<p><i>Requirements for successfully passing the module</i></p> <p><i>The final grade in the course is composed of 40% performance on the final exam, 20% on midterm test, 25% on project, and 15% on practice. Students must have a final grade of 50% (5/10) or higher to pass the course.</i></p>
Reading list	<p><i>Xác suất - Thống kê & phân tích số liệu. Nguyễn Tiến Dũng (chủ biên), Nguyễn Đình Huy. NXB Đại học Quốc gia TP HCM, 2019.</i></p> <p><i>Applied Statistics and Probability for Engineers. Douglas C. Montgomery, George C. Runger. Hoboken, NJ: Wiley, 2007.</i></p>

¹ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Numerical Methods**Course ID: MT1009**

Module designation	<i>Numerical Methods</i>
Semester (s) in which the module is taught	3, 4
Person responsible for the module	<i>Dr. Dau The Phiet</i>
Language	<i>Vietnamese, English</i>
Relation to curriculum	<i>Compulsory</i> 
Teaching methods	<i>lecture, lesson, project</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:</i> <i>Contact hours: 45</i> <i>Private study including examination preparation, specified in hours¹: 90</i>
Credit points	3
Required and recommended prerequisites for joining the module	<i>Calculus 1, Calculus 2, Linear Algebra</i>
Module objectives/intended learning outcomes	<i>Upon completion of this course, students know how to / are able to:</i> <ul style="list-style-type: none">- State basic definitions and results of functions of numerical analysis- Analyse and choose suitable tools to solve problems.- Use the softwares to solve mathematical problems.- Work in a team effectively

Content	<p>The following topics will be presented and discussed in this course:</p> <ul style="list-style-type: none"> - Approximate numbers, errors, the rules of rounding number - Solving approximately nonlinear equation - Solving approximately algebraic linear system - Interpolation and approximation of functions - Evaluating derivatives and definite integrals - Numerical methods for solving ordinary differential equation (Cauchy problem) - Boundary problem for differential equation second order <p>Application of numerical methods in solving theoretical and applied problems. Solving all discussed problems by using computer software.</p>
Exams and assessment formats	<p><i>Multichoice Midterm assessments (50 minutes) and a Final exam (100 minutes), short computer-based quizzes, report for the project.</i></p>
Study and examination requirements	<p>Requirements for successfully passing the module</p> <p>e.g. the final grade in the module is composed of 50% performance on exams, 5% quizzes, 25% midterm assignments, 20% work in group project. Students must have a final grade of 30% or higher to pass</p>
Reading list	<p>[1] Burden, R.D and Faires, D., Numerical Analysis, Brooks/Cole Publishing Company.</p> <p>[2] Steven C. Chapra, Raymond P. Canale., Numerical methods for Engineers, McGraw-Hill Education.</p>

¹ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Physics 1**Course ID: PH1003**

Module designation	<i>Physics 1</i>
Semester (s) in which the module is taught	2
Person responsible for the module	<i>Ly Anh Tu, Ph.D.</i>
Language	<i>Vietnamese, English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Ass. : Assignment, homework Project: group assignment Midterm test : multiple-choice Final exam: multiple-choice</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload: 201 Contact hours (lecture, exercise, seminar): 59 Private study including examination preparation, specified in hours¹: 132.</i>
Credit points	4
Required and recommended prerequisites for joining the module	<i>None</i>
Module objectives/intended learning outcomes	<ul style="list-style-type: none">• <i>Presenting the basic knowledge of Physics A1 at the university level.</i>• <i>Applying scientific reasoning, logical thinking, as a basic for studying and researching the engineering specialties and technical specialties in the future.</i>• <i>Self-learning, researching, drafting and presenting (writing and speaking) the physics related topics.</i>

	<ul style="list-style-type: none"> • <i>Using computational programs to solve problems of physics.</i>
Content	<i>Introduction of the course</i>
	<i>Mechanics</i> 1. <i>Fundamentals of kinematics</i> 2. <i>Laws of motion</i> 3. <i>Dynamics of particle systems</i> <i>Mechanics of rigid bodies</i>
	<i>Thermodynamics</i> 4. <i>Thermodynamics of gas</i> 5. <i>Laws of thermodynamics</i>
	<i>Electricity</i> 6. <i>Electrostatics in free space</i> 7. <i>Dielectrics and conductors</i>
	<i>Magnetostatics</i> 8. <i>Magnetostatics in free space</i>
Exams and assessment formats	<i>Assignment; project (group assignment); Midterm test (multiple choice, problems- 70 minutes); Final exam (multiple choice, problems- 90 minutes).</i>
Study and examination requirements	<ul style="list-style-type: none"> - <i>Ass. : Assignment, homework</i> - <i>MTest: Midterm test (60')</i> - <i>Exam: Final Exam (90')</i> - <i>Project: group assignment</i>
Reading list	1. <i>Nguyen Thi Be Bay et al., General Physics A1, HCMUT Textbook, 2016.</i> 2. <i>Tran Van Luong et al., General Physics Practice A1, VNU-HCMC pub., 2018</i>

	<p><i>Study materials can be downloaded from BKEL (http://e-learning.hcmut.edu.vn/). The lecture slides are updated weekly according to the progress of class. Besides, students can self-study and learn more through the following documents:</i></p> <p><i>3. Halliday, Resnick, Walker, Fundamental physics, Edu. Pub., 2000.</i></p> <p><i>4. Serway, Jewett: Physics for Scientists and Engineers – 10th Edition, Cengage, 2019.</i></p>
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¹ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be

General Physics Labs**Course ID: PH1007**

Module designation	<i>General Physics Labs</i>
Semester(s) in which the module is taught	2
Person responsible for the module	<i>M.Sc. Tran Anh Tu / Dr.Eng. Tran Trung Nghia</i>
Language	<i>Vietnamese/English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, lesson, lab works</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload¹: 90</i> <i>Contact hours (lecture, lesson, lab works): 30;</i> <i>Private study including pre-lab preparation and lab report specified in hours: 60.</i>
Credit points	<i>1</i>
Required and recommended prerequisites for joining the module	<i>None</i>

<p>Module objectives/intended learning outcomes</p>	<p><i>The course is one of the courses integrated into almost the curriculum programmes that is to get students to appreciate the underlying theories or principles of science and engineering by acquiring practical or hands-on experience from the lab experiments. During the lab session, students are required to form several groups to share instruments and equipment in their lab experiment.</i></p> <p>Course objectives: <i>This course helps students getting to:</i></p> <ul style="list-style-type: none"> - <i>master basic physics concepts by performing an experiment relevant to corresponding course work;</i> - <i>gain hands-on experiences with experimental processes and develop effective written communication skills;</i> - <i>develop collaborative learning skills by working in a group.</i> <p>Intended learning outcomes: <i>On successful studying of this course, students can acquire the following learning outcomes:</i></p> <p><i>L.O.1 Demonstrating basic experimental skills by the practice of setting up and conducting an experiment;</i></p> <p><i>L.O.2 Demonstrating an understanding of the analytical methods required to interpret, analyze results, and draw conclusions as supported by experimental data;</i></p> <p><i>L.O.3 Demonstrating basic communication skills by working in groups on laboratory experiments and the thoughtful discussion and interpretation of data.</i></p>
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<p>Content</p>	<p><i>This course provides an introduction to experimentation and demonstration the physics of mechanics, waves, optics, fluids, thermodynamics, electronics, electricity, and electromagnetism. Class time is comprised of fifteen 2hr laboratory sessions spread over the semester.</i></p> <p>Orientation (lev. 1)²:</p> <ul style="list-style-type: none"> - Lab resources; - Safety. Plagiarism. Report writing. Measurements and Uncertainties (lev. 2). Graphing (lev. 2). <p>Precision measuring instruments (lev. 2).</p> <p>Laboratories (lev. 2): <i>Each semester, based on the condition of equipment and schedule, the instructor will select the appropriate laboratories (at least 07 for the standard programme, and at least 08 for the international programme).</i></p> <ul style="list-style-type: none"> - Lab 1: determining density of rigid objects. - Lab 2: determining the gravitational acceleration with areversible pendulum. - Lab 3: determining the moment of inertia of a flywheel and the friction force of rotary bearings. - Lab 4: thermocouple. - Lab 5: measuring viscosity of a liquid using Stoke's method. - Lab 6: determining unknown resistance and capacitance using neon lamp oscillator circuit. - Lab 7: DC and AC circuits. - Lab 8: measuring refractive index of glass using microscope. - Lab 9: measuring focal lengths of convex and concave lenses. - Lab 10: determining the C_p/C_v ratio of gas.
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	<p style="text-align: center;">C_v</p> <ul style="list-style-type: none"> - Lab 11: measuring the wavelength of a laser using the planar diffraction grating. - Lab 12: Newton's laws. - Lab 13: Conservation of momentum. - Lab 14: The RLC resonant circuit (I). - Lab 15: The RLC resonant circuit (II). - Lab 16: e/m of the electron. - Lab 17: verification of Stefan-Boltzman law. <p>Discussion and report evaluation days (at least 03 times).</p>
Exams and assessment formats	<ul style="list-style-type: none"> - Pre-lab (15-minute quiz at the start of each session and preparation); - Lab works (attendance, participation); - Laboratory reports.
Study and examination requirements	<p>The final grade is composed of 50% performance in the lab contributions (pre-lab, attendance, participation) and performance 50% in laboratory reports. Students must complete the required laboratories (at least 06 for the standard programme, at least 07 for the international programme) and have a final grade of 50% or higher to pass.</p> <p>1. The grading guidelines are as follows:</p> <p>Prelab (10%); Attendance (20%); Participation (20%); Laboratory Reports (50%).</p> <p>2. A grade of zero (0) will be given for any missed experiment with no excuse.</p>

	<p>3. <i>Submission of the lab report is due the following week class begins – penalty for lateness is 10% per day.</i></p> <p>4. <i>Laboratory Report Grading (points):</i></p> <ul style="list-style-type: none"> - <i>Style; font type, font size, line space, margin, etc. given by the lab instructor (0.5)</i> - <i>Title (0.5)</i> - <i>Introduction including Objective and Theoretical Background (0.5)</i> - <i>Experimental Procedure (0.5)</i> - <i>Results: Experimental Data (1.5) and Calculation (1.5)</i> - <i>Discussion and analysis of results; Answers to questions (3.5)</i> - <i>Conclusions (1.0)</i> - <i>Raw Data Sheet (0.5); unless otherwise instructed, raw data sheets (or photocopies of raw data) should be attached in the lab report. The raw data should be checked and signed by the instructor at the completion of the lab experiment.</i>
Reading list	<p>[1]. <i>Trần Anh Tú, Nguyễn Minh Châu, Trần Trung Nghĩa, Nguyễn Dương Hùng, Nguyễn Thị Hương Linh, Trịnh Trần Hồng Duyên. Thí nghiệm Vật lý đại cương A, NXB ĐHQG HCM-2020.</i></p> <p>[2]. <i>Tran Anh Tu, Tran Trung Nghia, Nguyen Minh Chau, Nguyen Duong Hung, Huynh Quang Linh, Tran Thi Thu Hanh, Ngo Thi Minh Hien, Vo Nhat Quang, Tran Phuoc Duy, General Physics Laboratory, VNU-HCM Press, 2021.</i></p>

¹ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to

² Level of difficulty based on Bloom's taxonomy (1: remember, 2: understand; 3: apply; 4: analyze; 5: evaluate; 6: create)

1.2 Humanities & Social Sciences Subjects

History of Vietnamese communist party

Module designation	<i>History of Vietnamese communist party</i>
Semester (s) in which the module is taught	2,3,4
Person responsible for the module	<i>Nguyen Huu Ky Ty</i>
Language	<i>Vietnamese</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, group work, homework</i>
Workload (incl. contact hours, self-study hours)	<p><i>(Estimated) Total workload: 108 hours.</i></p> <p><i>Contact hours: 24 hours lecture, 18 hours group work.</i></p> <p><i>Private study including examination preparation, specified in hours: 66 hours</i></p>
Credit points	2
Required and recommended prerequisites for joining the Module	<i>Pre-study of Scientific socialism</i>
Module objectives/intended learning outcomes	<ul style="list-style-type: none"> - <i>Knowledge: understand and be able to analyze and generalize the process of forming and developing the views and policies of the Communist Party of Vietnam during the process of leading the Vietnamese revolution.</i> - <i>Skills: applying historical awareness into practice, criticizing misconceptions about the line of the Communist Party of Vietnam; training capacity for independent thinking in researching, discovering and solving problems from the reality of the country's socio-economic</i>

	<p><i>development; ability to work effectively as a team for a common goal.</i></p> <p><i>- Competences: Building a serious working habit, a sense of respect for objective truth, raising students' pride and confidence in the leadership of the Communist Party of Vietnam in the past and present.</i></p>
Content	<p><i>Equipping students with the knowledge of subjects, purposes, tasks, research and study methods of the module, History of Communist Party, as well as the basic, core and systematic knowledge about the birth of the Party (1920-1930), the process of the Party leading the revolutionary struggle for power (1930-1945), leading two resistance wars against French colonialism and American imperialist invasion, completing national liberation, unifying the country (1945 - 1975), leading the country in transition to socialism and innovation process (1975-2018). Thereby affirming the successes, raising the limitations, summarizing the experiences of the revolutionary leadership of the Party to help learners raise awareness, belief in the Party and the ability to apply the learned knowledge into working practice, contributing to the construction and protection of the Socialist Republic of Vietnam.</i></p>
Exams and assessment formats	<p><i>- In-class participation: Regular testing and assessment, etc</i></p>

	<p>- Coursework: Essay.</p> <p><i>Final Exam: Multiple choice (50 minutes).</i></p>
Study and examination requirements	<p><i>Requirements for successfully passing the module</i></p> <p>- The final grade in the module is composed of 50% final exam, 30% coursework, 20% in-class participation. Students must have a final grade of 50% or higher to pass.</p>
Reading list	<ol style="list-style-type: none"> 1. Ministry of Education and Training, <i>Textbook of History of the Communist Party of Vietnam (for universities – non- specialized Political Science system)</i>, (waiting for textbooks of the Ministry of Education and Training). 2. Ministry of Education and Training (2006), <i>Textbook of History of the Communist Party of Vietnam (for universities and colleges)</i>, first reprinted edition, National Politics Publisher, Hanoi. 3. Communist Party of Vietnam, <i>Complete Documents of the Party</i>, National Politics Publisher, Hanoi 4. Dao Thi Bich Hong (2017), <i>Southern Security Force during the anti-US period (Monograph book)</i>, Culture and Arts Publisher, Ho Chi Minh. <p>Dao Thi Bich Hong (2019), <i>Economic restructuring (A case study of Bac Lieu province) (Monograph book)</i>, Vietnam National University- Ho Chi Minh City Publisher.</p>

Ho Chi Minh ideology

Module designation	Ho Chi Minh ideology
Semester(s) in which the module is taught	3,4
Person responsible for the module	<i>Phan Duy Anh</i>
Language	<i>Vietnamese</i>
Relation to curriculum	Compulsory
Teaching methods	Lecture, group work, homework.
Workload (incl. contact hours, self-study hours)	<p><i>(Estimated) Total workload: 108 hours.</i></p> <p>Contact hours: 24 hours lecture, 18 hours group work.</p> <p><i>Private study including examination preparation, specified in hours: 66 hours</i></p>
Credit points	2
Required and recommended prerequisites for joining the module	<i>Pre-study of History of Communist Party of Vietnam</i>
Module objectives/intended learning outcomes	<ul style="list-style-type: none"> - <i>Knowledge: Understand, master and state the formation and development of Ho Chi Minh ideology; name and analyze basic stages in the formation and development processes of Ho Chi Minh ideology.</i> - <i>Skills: Build and strengthen materialist worldview and dialectical methodology.</i> - <i>Attitudes: Raise national pride, be proud of Vietnam Communist Party and President Ho Chi Minh</i>

Content	<i>This course provides systematic knowledge of origin of Ho Chi Minh ideologies, the basic contents of Ho Chi Minh ideologies and applied process of Ho Chi Minh ideologies into solving practical problems of Vietnam's revolution. Contacting practical Ho Chi Minh ideologies as a creative application of Marxism - Leninism to specific conditions of Vietnam is shown in the lines, guidelines and policies of Vietnam Communist Party and the State law.</i>
Exams and assessment formats	<ul style="list-style-type: none"> - <i>In-class participation: Regular testing and assessment, etc</i> - <i>Coursework: Essay.</i> - <i>Final Exam: Multiple choice (40 minutes).</i>
Study and examination requirements	Requirements for successfully passing the module - The final grade in the module is composed of 50% final exam, 30% coursework, 20% in-class participation. Students must have a final grade of 50% or higher to pass.
Reading list	<p><i>Main textbooks:</i></p> <p><i>[1]. Ministry of Education and Training: Ho Chi Minh's Ideology Textbook (For College and University students not majoring in Marxist-Leninist Philosophy and Ho Chi Minh's Ideology), National Politics Publisher, Hanoi, 2018.</i></p> <p><i>[2] Ministry of Education and Training: Ho Chi Minh's Ideology Textbook (For College and University students not majoring in Marxist-Leninist Philosophy and Ho Chi Minh's Ideology), circulated in 2019, waiting for being published (provided by lecturers).</i></p> <p><i>References:</i></p> <p><i>[3]. National Textbook Edition Council: Ho Chi Minh's Ideology Textbook, National Politics Publisher, Hanoi, 2004.</i></p>

	<p><i>[4]. Complete works of Ho Chi Minh, 15 volumes, National Politics Publisher, Hanoi, 2011.</i></p> <p><i>[4]. Selected Works of Ho Chi Minh, National Politics Publisher, Hanoi, 2004.</i></p> <p><i>[5]. Lai Quoc Khanh, Phan Duy Anh, Ho Chi Minh's Political Philosophy: Structure, Features and Value, Social Sciences and Humanity Magazine, Volume 2, No.1, 2016.</i></p> <p><i>[6]. Phan Duy Anh, The Power of National great unity in August 1945 Revolution- An evidence of Ho Chi Minh's Philosophy about Political subject, Social Sciences and Humanity Magazine of Ho Chi Minh City, Aug, 2015.</i></p> <p><i>[7]. Phan Duy Anh, Culture- A way to understand by Ho Chi Minh in Prison Diary, Nhip Cau Tri Thuc Magazine, Sep, 2013.</i></p> <p><i>[8]. Tran Thi Thu Hoai, Phan Duy Anh, Four "Truth" in Ho Chi Minh's Testament on building the Ruling Party, Political Science Magazine, Sep, 2013.</i></p> <p><i>[9]. Nguyen Van Khanh, Phan Duy Anh, Ho Chi Minh and talent issue, Communist Party's History Magazine, May, 2010.</i></p>
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Introduction to Vietnamese Law

Module designation	<i>Introduction to Vietnamese Law</i>
Semester(s) in which the module is taught	<i>211</i>
Person responsible for the module	<i>Le Mong Tho</i>
Language	<i>Vietnamese</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, Lesson, teamwork, homework, essay</i>
Workload (incl. contact hours, self-study hours)	<p><i>(Estimated) Total workload: 90.8 Contact hours: 24 hours lecture</i></p> <p><i>Private study including examination preparation, specified in hours¹: 66 hours.</i></p>
Credit points	<i>2</i>
Required and recommended prerequisites for joining the module	<i>NA</i>
Module objectives/intended learning outcomes	<p>About the knowledge: <i>To be able to acknowledge, present the basic concepts of the State, the laws, and theories of some legal fields of Vietnamese legal system; To be able to evaluate the appropriateness of the impact of the laws on legal phenomena related to society in general and to major of students in particular.</i></p> <p>About the skills: <i>To be able to self-study, teamwork, to update and improve knowledge of legal science; To be able to deal with common legal situations in family and in society.</i></p>

	<p>About the manner: To be aware of ethical and legal issues, strictly comply with the School's regulations; To actively strive to prevent and eliminate illegal acts; to believe and uphold the principle "Living and working in accordance with the laws".</p>
Content	<ul style="list-style-type: none"> - Gaining the full knowledge of the State and the law from the perspective of Marxism-Leninism, having a firm grasp of the Party's and State's views, undertakings, policies performed in the provisions of the law. - Gaining skills to handle cases in relation to real life and law; being aware of standards of conduct as regulated by the law in order to live and work pursuant to the law. - Gaining ability to update topical issues in legal field; boosting legal awareness, civic awareness of students in University activities and in society. - Practicing honesty, responsibility, professional ethics, discipline, professionalism and the ability to adapt to changes in reality.
Exams and assessment formats	<ul style="list-style-type: none"> - Regular evaluation: Attendance, performance in classes: 20%. - Coursework (essay): 30%. - End-of- module exam (EXAM): 50% (multiple choice, no materials allowed, 50 minutes, test question sheet must be returned).

Study and examination requirements	<p>- <i>Students must not be absent more than 20% of the total number of module's periods.</i></p> <p>- <i>Students read materials and fully prepare the topics specified in the Course Syllabus, read the reference materials and research before the lecture about the content to be learned during the week.</i></p> <p>- <i>Students have to watch all instructional videos and take quizzes with a score of 5 or higher for each.</i></p>
Reading list	<p><i>a. Main Textbooks</i></p> <p><i>Ministry of Education and Training (2019), General Law Textbook, University of Education Publishing House.</i></p> <p><i>b. References</i></p> <p><i>[1] Constitutional Law 2013; Administrative Law; Criminal Law 2015, Criminal Procedure Law 2015; Civil Law 2015, Civil Procedure Law 2015; Labor Law 2019.</i></p> <p><i>[2] Legal documents relating in each lesson.</i></p>

¹ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Person responsible for the module Marxist-Leninist philosophy	<i>Vu Quoc Phong.</i>
Language	<i>Viet Nam</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, group work, homework.</i>
Workload (incl. contact hours, self-study hours)	<p><i>(Estimated) Total workload: 108 hours.</i></p> <p><i>Contact hours: 24 hours lecture, 18 hours group work.</i></p> <p><i>Private study including examination preparation, specified in hours¹: 66 hours.</i></p>
Credit points	<i>2</i>
Required and recommended prerequisites for joining the module	<i>Pre-study of Marxist-Leninist philosophy</i>
Module objectives/intended learning outcomes	<ul style="list-style-type: none"> - <i>Knowledge: Equipping students with basic knowledge about economic categories and laws to form economic thinking.</i> - <i>Skills: Formation of skills to apply, analyze and evaluate socio- economic issues in the development process of the country and the students.</i> - <i>Competences: Contribute to building stance, ideology, social responsibility of students in work and life.</i>
Content	<i>The subject includes knowledge such as: goods, markets; produce surplus value; competition and monopoly; the socialist- oriented market economy in Vietnam; economic benefit relations in Vietnam; industrialization, modernization and international economic integration of Viet Nam.</i>

Exams and assessment formats	<p>- <i>In-class participation: Regular testing and assessment, etc</i></p> <p>- <i>Coursework: Essay.</i></p> <p>- <i>Final Exam: Multiple choice (40 minutes).</i></p>
Study and examination requirements	<p><i>Requirements for successfully passing the module</i></p> <p><i>The final grade in the module is composed of 50% final exam, 30% coursework, 20% in-class participation.</i></p> <p><i>Students must have a final grade of 50% or higher to pass.</i></p>
Reading list	<p>[01] <i>Ministry of Education and Training. (2019). Textbook of Marxist - Leninist Political Economy. Hanoi: National Politics Publisher.</i></p> <p>[02] <i>Ministry of Education and Training. (2006). Textbook of Marxist - Leninist Political Economy. Hanoi: National Politics Publisher.</i></p> <p>[03] <i>Karl Marx – Engels. (2004). The Complete Series – Volume 20, 23, 25. Hanoi: National Politics Publisher.</i></p> <p>[04] <i>Communist Party of Vietnam. (2016). Final report of some theoretical - practical issues during 30 years of innovation. Hanoi: National Politics Publisher.</i></p> <p>[05] <i>Communist Party of Vietnam. (2016). Documents of 12th National Congress of the Communist Party of Vietnam. Hanoi: National Politics Publisher.</i></p> <p>[06] <i>Communist Party of Vietnam. (2017). Resolution No.11- NQ/TW dated June 03rd 2017 of Party Central Committee on “The completion of socialist-oriented market economy institutions”.</i></p> <p>[07] <i>Jeremy Rifkin. (2014). The Third Industrial Revolution. Hanoi: Labour and Society Publisher.</i></p>

	<p>[08] <i>The Central Council's direction on the compilation of national textbook of Marxist- Leninist science courses, Ho Chi Minh's Ideology.</i>(2004). <i>Marxist-Leninist Scientific Socialism Textbook</i>, Hanoi: National Politics Publisher.</p> <p>[09] Lenin. (2005). <i>The Complete Series – Volume 3</i>, 27, 31. Hanoi: National Politics Publisher.</p> <p>[10] Manfred B. Steger. (2011). <i>Globalization</i>. Hanoi: Knowledge Publisher.</p> <p>[11] Klaus Schwab. (2018). <i>The Fourth Industrial Revolution</i>. Hanoi: National Politics Publisher</p> <p>[12] Nguyen Hong Hai, Vu Quoc Phong, Nguyen Thi Thu Trang &Đo Thi Thuy Yen. (2016). <i>The history of economic theoriesTextbook</i>. Ho Chi Minh City: Publishing House of Ho Chi Minh City University of Education.</p> <p>[13] The Prime Minister. (2017). Directive No. 16/CT-TTg of the Prime Minister dated May 04th 2017 on “The strengthening of theabilityto access the Fourth Industrial Revolution”.</p> <p>thermore, there are other learning materials on website EL: http://e-learning.hcmut.edu.vn</p>
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¹ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Module designation	Marxist – Leninist philosophy
Semester (s) in which the module is taught	1
Person responsible for the module	PhD. Nguyen Thi Minh Huong
Language	Vietnamese
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, essay, seminar</i>
Workload (incl. contact hours, self-study hours)	<p><i>(Estimated) Total workload: 123,83 Contact hours (lecture, exercise.): 42</i></p> <p>Private study including examination specified in hours¹: 93</p>
Credit points	3
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<ul style="list-style-type: none"> - Provide primitive and systematic insights on Marxist - Leninist philosophy - Building a worldview of dialectical materialism and methodological materialism dialectics as the theoretical basis for the awareness of issues and content of other subjects - Recognizing the very intrinsic valuable, scientific and revolutionary nature of Marxist – Leninist philosophy

Content	<ul style="list-style-type: none"> - Chapter 1 introduces the most general features of philosophy as well as Marxist - Leninist philosophy and the role of Marxist - Leninist philosophy in social life. - Chapter 2 presents the basic contents of dialectical materialism, including matter and consciousness; materialist dialectics; Cognitive reasoning of dialectical materialism. - Chapter 3 brings out the basic contents of historical materialism, including socio-economic morphological issues; class and ethnicity; government and social revolution; social awareness; philosophy of people.
Exams and assessment formats	<ul style="list-style-type: none"> - Regular testing and assessment (BT): Attendance, discussion, presentation, exams, lesson contribution, BKE_learning... - Coursework: Essay - End-of-course exam: Open-ended questions exam (Examination time: 90 minutes).
Study and examination requirements	<ul style="list-style-type: none"> - Assignment: 20% (Attendance: 10%; Discussion or presentation: 10%). - Coursework: 30% (03 Coursework /01 Essay). Students shall submit coursework in week 13 of the course (15-week course). 30% of points will be deducted for late submission with reasonable excuse for each delayed week, deadline for late submission is at week 14. - Final Exam: 50% (Quiz (do not use documents). - Conditions for end-of-course exam: Students are required to attend at least 80% of lectures (number of attendance checking), to complete all assignments and participate fully groupwork activities.

Reading list	<p>1. The Central Council's direction on the compilation of national textbook of Marxist-Leninist science courses, Ho Chi Minh's Ideology, <i>Marxist-Leninist Philosophy Curriculum</i>, National Politics Publisher, Hanoi, 1999.</p> <p>2. Ministry of Education and Training, <i>Marxist-Leninist Philosophy Curriculum (For students not majoring in Political Theory)</i>, National Politics Publisher, Hanoi, 2021.</p> <p>3. Nguyen Thi Minh Huong, Le Duc Son, <i>Learning materials: Marxist-Leninist Philosophy</i>, (ISBN: 978 – 604 – 73 – 806) Vietnam National University – Ho Chi Minh City Publisher, 2021.</p>
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¹ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

SCIENTIFIC SOCIALISM

Module designation	<i>SCIENTIFIC SOCIALISM</i>
Semester(s) in which the module is taught	<i>203, 211</i>
Person responsible for the module	<i>PHD. THI NGOC TRINH AN</i>
Language	<i>Vietnamese</i>
Relation to curriculum	<i>Training program of Faculty: All faculties</i>
Teaching methods	<i>Interpretation, present, semina,</i>
Workload (incl. contact hours, self-study hours)	<i>Total number of periods in course schedule: 30 Total number of studying/ working hours: 98.80 Theory: 24 (1,6)</i> <i>Coursework/Essay/Project: 18 (0.4)</i> <i>Self-study: 66</i>
Credit points	<i>02</i>
Required and recommended prerequisites for joining the module	<i>Marxist Leninist Political Economy</i>
Module objectives/intended learning outcomes	<ul style="list-style-type: none"> - <i>Knowledge: Students understand and master the most basic, fundamental knowledge of scientific socialism.</i> - <i>Skills: Students enhance realistic ability and the capacity to apply knowledge of the subject to the consideration and assessment of socio-political issues of the country</i>

	<p>- <i>Competences: Students Building trust, right political attitudes and ideas about scientific socialism module in particular and the Party's ideology in general</i></p>
Content	<p><i>The scientific socialism subject of is one of the three components of Marxism – Leninism, As a result of applying the worldview, Marxist - Leninist methodolog and the doctrines of Marxist - Leninist political economy into studying the indispensable rule of the birth of the socialist socio- economic form; Socio-political issues that are normative in the process of socialist revolution in the world and in real life in Vietnam today.</i></p>
Exams and assessment formats	<p>- <i>Regular testing and assessment (assignment): 20%</i></p> <p><i>(Attendance, discussion, classroom tasks, BK Elearning...)</i></p> <p>- <i>Coursework: 30% (Essay)</i></p> <p>- <i>Final exam: 50% (Multiple-choice)</i></p>
Study and examination requirements	<p><i>Requirements for successfully passing the module e.g. the final grade in the module is composed of 60% performance on exams, 10% quizzes, 10% take-home assignments, 10% in- class participation. Students must have a final grade of 60% or higher to pass</i></p>
Reading list	<p>Coursebook:</p> <p>[1]. Ministry of Education and Training (2019). Scientific Socialism Coursebook (for higher education –</p>

	<p>not majoring in Political Science). Corrections and addtions were added after pilot teaching.</p> <p>References:</p> <p>[1]. The Central Council’s direction on the compilation of national textbook of Marxist-Leninist science courses, Ho Chi Minh's Ideology, Marxist-Leninist Philosophy Coursebook National Politics Publisher, Hanoi.</p> <p>[2]. Ministry of Education and Training (2006), Scientific SocialismCoursebook – Used in universities, colleges, National PoliticsPublisher, Ha Noi.</p> <p>[3]. An Thi Ngoc Trinh (2017), Building contemporary family culture in Vietnam , University of Education Publishing House, Ho Chi Minh City.</p>
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1.3 Languages Subjects

English 1

A **Module Handbook** or **collection of module descriptions** that is also available for students to consult should contain the following information about the individual modules:

Module designation	<i>ENGLISH 1</i>
Semester(s) in which the module is taught	<i>1</i>
Person responsible for the module	<i>Hoàng Võ Bích Phương</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, lesson, group discussion, presentation</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:</i> <i>Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 hours, 22.5 hours of exercises</i> <i>Private study including examination preparation: approx.. 150 hours</i>
Credit points	<i>2</i>
Required and recommended prerequisites for joining the module	<i>No</i>
Module objectives/intended learning outcomes	<i>Upon completion of the module, students will be able to”</i> <i>- Knowledge: lexical resources regarding common topics for everyday communication; use certain grammar points properly.</i>

	<ul style="list-style-type: none"> - <i>Skills: clearly discuss and communicate the themes of the book contents.</i> - <i>Competences: evaluate new information and develop their own opinions and ideas to share when engaging in group discussions.</i>
Content	<i>Authentic materials and motivating stories regarding the topics of where their Heart is, Health and Happiness, Learning, and Family and Friends.</i>
Exams and assessment formats	<i>Multiple choice questions: one Midterm test (50 min), one Final exam (50 min); in-class and online quizzes, take-home written assignments.</i>
Study and examination requirements	<i>The final grade in the module is composed of 50% performance on exams, 20% mid-term assessment, 20% quizzes and assignments, 10% take-home assignments, 10% online tasks. Students must have a final grade of 50% or higher to pass</i>
Reading list	<i>Douglas, N., & Morgan, J. (2018). Perspectives 1. Cengage Learning.</i>

English 2

Module designation	<i>English 2</i>
Semester(s) in which the module is taught	2
Person responsible for the module	<i>Nguyen Thanh Thuy</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, lesson, group discussion, presentation.</i>
Workload (incl. contact hours, self-study hours)	<p><i>(Estimated) Total workload:</i></p> <ul style="list-style-type: none"> <i>Contact hours: 45 hours of lecture and classwork, 22.5 hours of exercises.</i> <i>Private study (including examination preparation): approx. 150 hours</i>
Credit points	2.0
Required and recommended prerequisites for joining the module	<i>English 1</i>
Module objectives/intended learning outcomes	<p><i>Upon completion of the module, students will be able to:</i></p> <ul style="list-style-type: none"> <i>Knowledge: use certain lexical resources regarding common topics for everyday communication; use certain grammar points properly.</i> <i>Skills: clearly discuss and communicate the themes of the book contents.</i>

	<ul style="list-style-type: none"> • <i>Competences: evaluate new information and develop their own opinions and ideas to share when engaging in group discussions.</i>
Content	<i>Authentic materials and motivating stories regarding the topics of emotions, travel, sports, food, and work, at intermediate levels.</i>
Exams and assessment formats	<i>Multiple choice questions: one Midterm test (50 minutes), one Final exam (50 minutes);</i> <i>In-class and online quizzes, take-home written assignments</i>
Study and examination requirements	<i>The final grade in the module is composed of:</i> <ul style="list-style-type: none"> • <i>50% performance on final exams,</i> • <i>20% on midterm test,</i> • <i>20% on in-classes participation and quizzes and, take-home assignments,</i> • <i>10% on online quizzes</i> <i>Students must have a final grade of 50% or higher to pass</i>
Reading list	Lansford, L., Barber, D., & Jeffries, A. (2018). Perspective 1B:Compo Split, Cengage ELT.

Module designation	ENGLISH 3
Semester(s) in which the module is taught	3
Person responsible for the module	Nguyen Cao Nguyen
Language	English
Relation to curriculum	Compulsory
Teaching methods	lecture, lesson, group discussion, presentation.
Workload (incl. contact hours, self-study hours)	<p>(Estimated) Total workload:</p> <p>Contact hours: 45 hours of lecture and classwork, 22.5 hours of exercises.</p> <p>Private study including examination preparation, specified in hours: approx. 150 hours</p>
Credit points	2
Required and recommended prerequisites for joining the module	English 2
Module objectives/intended learning outcomes	<p>Upon completion of the module, students will be able to:</p> <ul style="list-style-type: none"> - Knowledge: use certain lexical resources regarding common topics for everyday communication; use certain grammar points properly. - Skills: clearly discuss and communicate the themes of the book contents. - Competences: evaluate new information and develop their own opinions and ideas to share when engaging in group discussions.

Contents	Authentic materials and motivating stories regarding the topics of emotions, travel, sports, food, and work, at intermediate levels
Exams and assessment formats	<ul style="list-style-type: none"> • Multiple choice questions: one Midterm test (50 minutes), one Final exam (50 minutes); • In-class and online quizzes, take-home written assignments
Study and examination requirements	<p>The final grade in the module is composed of:</p> <ul style="list-style-type: none"> • 50% performance on final exams, • 20% on midterm test, • 20% on in-classes participation and quizzes and, take-home assignments, • 10% on online quizzes <p>Students must have a final grade of 50% or higher to pass</p>
Reading list	Lansford, L., Barber, D., & Jeffries, A. (2018), <i>Perspective 2A: Compo Split</i> , Cengage ELT.

English 4

Module designation	<i>ENGLISH 4</i>
Semester(s) in which the module is taught	4
Person responsible for the module	Nguyễn Trang Dung
Language	English
Relation to curriculum	Compulsory
Teaching methods	Interactive lecture, blended learning, group discussion
Workload (incl. contact hours, self-study hours)	<p>Total workload:</p> <p>Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 hours of lecture and classwork, 22.5 hours of exercises</p> <p>Private study including examination preparation: 150 hours</p>
Credit points	2.0
Required and recommended prerequisites for joining the module	English 3
Module objectives/intended learning outcomes	<p>Upon completion of the module, students will be able to:</p> <ul style="list-style-type: none"> • Knowledge: use certain lexical resources regarding common topics for everyday communication; use certain grammar points properly. • Skills: clearly discuss and communicate the themes of the book contents. • Competences: evaluate new information and develop their own opinions and ideas to share when engaging in group discussions.

Content	<i>Authentic materials and motivating stories regarding the topics of superhuman, shopping, communication, entertainment, and time, at intermediate levels</i>
Exams and assessment formats	<p><i>Multiple choice questions: one Midterm test (50 minutes), one Final exam (50 minutes);</i></p> <ul style="list-style-type: none"> <i>In-class and online quizzes, take-home written assignments</i>
Study and examination requirements	<p><i>The final grade in the module is composed of:</i></p> <ul style="list-style-type: none"> <i>50% performance on final exams,</i> <i>20% on midterm test,</i> <i>20% on in-classes participation and quizzes and, take-home assignments,</i> <i>10% on online quizzes</i> <p><i>Students must have a final grade of 50% or higher to pass.</i></p>
Reading list	<i>Lansford, L., Barber, D., & Jeffries, A. (2018), Perspective 2B: Compo Split, Cengage ELT.</i>

1.4 Physical Education & Military Training

Module Handbook for Basket ball

A **Module Handbook** or collection of module descriptions that is also available for students to consult should contain the following information about the individual modules:

Module designation	<i>Basket ball</i>
Semester(s) in which the module is taught	<i>3 SEMESTERS</i>
Person responsible for the module	<i>Trần Quang Vinh</i>
Language	<i>Vietnamese</i>
Relation to curriculum	<i>elective</i>
Teaching methods	<i>lecture, lesson, exercise.</i>
Workload (incl. contact hours, self-study hours)	<p><i>(Estimated) Total workload: 90 hrs</i></p> <ul style="list-style-type: none"> <i>Theory: 20 hours</i> <i>Practice: 70 hours</i> <p><i>Private study including examination preparation, specified in hours²: N/A</i></p>
Credit points	<i>3 credits</i>
Required and recommended prerequisites for joining the module	<i>None</i>
Module objectives/intended learning outcomes	<ul style="list-style-type: none"> <i>Law of Basketball , theory of basic technique</i> <i>Skills: complete practical subject</i> <i>Competences: Students know how to play basket ball</i>

² When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Content	<ul style="list-style-type: none"> - <i>rules of Basket ball</i> - <i>theory basic technique.</i> - <i>good practical skills</i>
Exams and assessment formats	<i>Students will complete subject by entirely of practical examination</i>
Study and examination requirements	<i>Final exam. Students must reach at least 50% of practical test requirements, students must attend fully.</i>
Reading list	<ul style="list-style-type: none"> - <i>giáo trình bóng rổ – trường ĐH TDTT TPHCM 2016</i> - <i>Luật bóng rổ - tổng cục TDTT 2018</i>

Module Handbook for *TABLE TENNIS*

A **Module Handbook** or collection of module descriptions that is also available for students to consult should contain the following information about the individual modules:

Module designation	<i>TABLE TENNIS</i>
Semester(s) in which the module is taught	<i>3 SEMESTERS</i>
Person responsible for the module	<i>(Le Quang Khoi)</i>
Language	<i>Vietnamese</i>
Relation to curriculum	<i>elective</i>
Teaching methods	<i>lecture, lesson, exercise.</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload: 90 hrs - theory : 20 hrs - Practice: 70 hrs Private study including examination preparation, specified in hours³: N/A</i>
Credit points	<i>3 credits</i>
Required and recommended prerequisites for joining the module	<i>None</i>
Module objectives/intended learning outcomes	<i>- Law of table tennis , theory of basic technique Skills: complete practical subject - Competences: Students know how to play tennis table .</i>

³ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Content	<ul style="list-style-type: none"> - <i>rules of table tennis</i> - <i>theory basic technique.</i> - <i>good practical skills</i>
Exams and assessment formats	<i>Students will complete subject by entirely of practical examination</i>
Study and examination requirements	<i>Students must reach at least 50% of practical test requirements, students must attend fully.</i>
Reading list	<ul style="list-style-type: none"> - <i>Giáo trình bóng bàn – trường đại học TDTT TPHCM 2016</i> - <i>Luật thi đấu bóng bàn – tổng cục TDTT năm 2016</i>

Module Handbook for Volley ball

A **Module Handbook** or collection of module descriptions that is also available for students to consult should contain the following information about the individual modules:

Module designation	<i>Volley ball</i>
Semester(s) in which the module is taught	<i>3 SEMESTERS</i>
Person responsible for the module	<i>Nguyễn Đức Toàn</i>
Language	<i>Vietnamese</i>
Relation to curriculum	<i>elective</i>
Teaching methods	<i>lecture, lesson, exercise.</i>
Workload (incl. contact hours, self-study hours)	<p><i>(Estimated) Total workload: 90 hrs</i></p> <ul style="list-style-type: none"> <i>Theory: 20 hours</i> <i>Practice: 70 hours</i> <p><i>Private study including examination preparation, specified in hours⁴: N/A</i></p>
Credit points	<i>3 credits</i>
Required and recommended prerequisites for joining the module	<i>None</i>
Module objectives/intended learning outcomes	<ul style="list-style-type: none"> <i>- Law of Volley ball , theory of basic technique.</i> <i>- Skills: complete practical subject</i> <i>- Competences: Students know how to play volley ball</i>

⁴ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Content	<ul style="list-style-type: none"> - <i>rules of volley ball</i> - <i>theory basic technique.</i> - <i>good practical skills</i>
Exams and assessment formats	<i>Students will complete subject by entirely of practical examination</i>
Study and examination requirements	<i>Final exam. Students must reach at least 50% of practical test requirements, students must attend fully.</i>
Reading list	<ul style="list-style-type: none"> - <i>giáo trình bóng chuyền – trường ĐH TDTT TPHCM 2017</i> - <i>Luật bóng chuyền - tổng cục TDTT 2017</i>

2. Module Handbooks for Basic-core and Specialized Subjects

Biological processes in environmental engineering

Module designation (Tên môn học)	<i>Biological processes in environmental engineering</i>
Semester(s) in which the module is taught (Học kỳ giảng dạy)	<i>Semester 5</i>
Person responsible for the module	<i>Assoc./Prof. Dr. Bui Xuan Thanh, Dr. Nguyễn Thái Anh, Dr. Phan Thanh Lam</i> <i>Please indicate a specific person.</i>
Language (ngôn ngữ)	<i>English, Vietnamese</i>
Relation to curriculum (Các môn học liên quan)	<i>Chemistry for Environmental Engineering (required)</i> <i>Names of other study programmes with which the module is shared</i> <i>(Environmental Engineering program)</i>
Teaching methods (Phương pháp giảng dạy)	<i>Lecture, seminar (invited expert, if any), presentation, video, lab visit (if any).</i>
Workload (incl. contact hours, self-study hours) (Thời lượng làm việc)	<i>Total workload:</i> <i>- 45 hr of lecture,</i> <i>- 135 hours of self-study</i>
Credit points (số tín chỉ)	<i>3</i>

Required and recommended prerequisites for joining the module (những yêu cầu kiến thức trước khi học)	<i>Basic knowledge on:</i> <ul style="list-style-type: none"> - <i>Environmental Chemistry;</i> - <i>Analytical chemistry;</i> - <i>Microbiology.</i>
Module objectives/intended learning outcomes (Mục tiêu môn học, yêu cầu CDR)	<i>Student understand the basics of biological processes and its application in environmental engineering.</i> <ul style="list-style-type: none"> - <i>Student understands the nature of biological processes in environment.</i> - <i>Students know how to calculate/apply the theory into practice.</i> - <i>Knowledge: familiarity with information, theory and/or subject knowledge</i> <i>Skills: cognitive and practical abilities for which knowledge is used</i> - <i>Competences: integration of knowledge, skills and social and methodological capacities in working or learning situations⁵</i>
Content (Nội dung)	<ul style="list-style-type: none"> - <i>Introduction, parameters used, pollutants transformation, kinetic, reaction rate, microbe growth, activated sludge processes, anaerobic processes, operational problems and solution, calculations and design.</i>

⁵ Cf. European Commission: Proposal for a Recommendation of the European Parliament and the European Council on the establishment of the European Qualifications Framework for lifelong learning, COM(2006) 479 final, 2006/0163 (COD), Brussels 05/09(2006).

Exams and assessment formats (Hình thức kiểm tra và thi)	<ul style="list-style-type: none"> • <i>Midterm: Term project (30 minutes/presentation)</i> • <i>Final exam: Writting exam (60-120 minutes)</i>
Study and examination requirements (Tỷ lệ đánh giá học tập)	<ul style="list-style-type: none"> • <i>Midterm: 30%</i> • <i>Final exam: 70%</i>

<p>Reading list (Tài liệu)</p>	<ul style="list-style-type: none"> • Metcalf & Eddy, (1991 & 2003), <i>Wastewater Engineering: Treatment and Reuse (3 rd & 4 th edition)</i>, McGraw-Hill • Nguyễn Văn Phước, <i>Giáo trình xử lý nước thải sinh hoạt và công nghiệp bằng phương pháp sinh học</i>, NXB Xây Dựng, 2007. • C.P. Leslie Grady, Glen T. Daigger, Henry C. Lim (1999), <i>Biological Wastewater treatment</i>, Marcel Dekker Inc • Joseph S. Devinny, Marc A. Deshusses, Todd S. Webster (1998), <i>Biofiltration and Air Pollution Control</i>, Lewis Publishers. • Bui Xuan Thanh, Chart Chiemchaisri, Takahiro Fujioka, Sunita Varjani (2018). <i>Water and Wastewater treatment technologies</i>, 2018, Springer. • Bùi Xuân Thành (2012), <i>Sổ Tay Hướng Dẫn Thiết Kế các Công Trình Xử Lý sinh học</i>, NXB ĐH Quốc Gia TPHCM • Bùi Xuân Thành & Lê Văn Khoa (2013), <i>Thuật ngữ chuyên ngành kỹ thuật & quản lý nước – nước thải</i>, NXB ĐH Quốc Gia TPHCM • Journals: Water Research, Bioresource Technology, Journal of Membrane Sciences, Environmental Technology, Water Scienceand Technology, Environmental Science Technology, Environmental Technology and Innovation, etc.
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CHEMISTRY FOR ENVIRONMENTAL ENGINEERING AND SCIENCE

Module designation (Tên môn học)	<i>CHEMISTRY FOR ENVIRONMENTAL ENGINEERING AND SCIENCE</i>
Semester(s) in which the module is taught (Học kỳ giảng dạy)	<i>Semester 3</i>
Person responsible for the module	<i>Vo Nguyen Xuan Que Ph.D., A/Prof. Nguyen Nhat Huy, MSc. Phan Xuan Thanh</i>
Language (ngôn ngữ)	<i>English</i>
Relation to curriculum (Các môn học liên quan)	<i>Compulsory</i>
Teaching methods (Phương pháp giảng dạy)	<i>lecture, lab works, seminar</i>
Workload (incl. contact hours, self-study hours) (Thời lượng làm việc)	<i>(Estimated) Total workload:</i> <i>Total workload:</i> <i>- 24 hr of lecture,</i> <i>- 12 hr of exercise</i> <i>- 30hr of experiment</i> <i>- 135 hous of self-study</i>
Credit points (số tín chỉ)	<i>3</i>
Required and recommended prerequisites for joining the module (những yêu cầu kiến thức trước khi học)	<i>Basic knowledge on:</i> <i>- Chemistry;</i> <i>- Analytical chemistry;</i>

Module objectives/intended learning outcomes (Mục tiêu môn học, yêu cầu CDR)	<i>This course provides the student with basic knowledge about environmental chemistry, analysis of pollutants in water and soil, and use them to assess environmental quality of water and soil. After finished the course, the student are require to understand the water and soil chemistry and analytical parameters for natural water, waste water and soil environment, recognize the source of pollutants, predict the behavior of pollutant in water and soil.to/are able to... ”</i>
Content (Nội dung)	<ul style="list-style-type: none"> - <i>Water chemistry: chemical equilibrium in water, water quality parameter, pollutant transformation</i> - <i>Soil chemistry: interaction between soil components, chemical reactions, pollutant behavior and toxicity</i>
Exams and assessment formats (Hình thức kiểm tra và thi)	<ul style="list-style-type: none"> - <i>Exercise: homework, exercise during class</i> - <i>Experiment</i> - <i>Final exam: Writing test</i>
Study and examination requirements (Tỷ lệ đánh giá học tập)	<ul style="list-style-type: none"> - <i>Exercise: 20%</i> - <i>Experiment: 30%</i> - <i>Final exam: 50%</i>
Reading list (Tài liệu)	<p><i>[1]. Werner Stumm; James J. Morgan (1995). Aquatic Chemistry: Chemical Equilibria and Rates in Natural Waters. Third edition. New York : John Wiley & Sons.</i></p> <p><i>[2] Stanley E. Manahan (2000). Environmental chemistry, Seven Edition, Lewis.</i></p> <p><i>[3]. Donald L. Sparks, Environmental Soil Chemistry, Second Edition, Academic Press, 2003.</i></p>

Ecology (EN1005)

Module designation (Tên môn học)	Ecology (EN1005)
Semester(s) in which the module is taught (Học kỳ giảng dạy)	142, 143, 151, 152, 161, 162, 171, 172, 181, 182, 201, 211
Person responsible for the module	<i>A/Prof. Đào Thanh Sơn , A/Prof. Dang Vu Bich Hanh,</i>
Language (ngôn ngữ)	<i>Vietnamese and English</i>
Relation to curriculum (Các môn học liên quan)	<i>Compulsory / elective / specialisation</i> <i>Environmental Toxicology</i> <i>Names of other study programmes with which the module is shared</i> <i>Chương trình thuộc Khoa Quản lý công nghiệp, và Bảo dưỡng Công nghiệp</i>
Teaching methods (Phương pháp giảng dạy)	<i>Lecture, lesson, seminar, braining storming, group discussion, video clip illustration, etc.</i>

Workload (incl. contact hours, self-study hours) (Thời lượng làm việc)	<p><i>(Estimated) Total workload: 137,2 units (1 unit ~ 60 min)</i></p> <p><i>Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 42 units for lecture (theory), 9 units for seminar during class</i></p> <p><i>Private study including examination preparation, specified in hours⁶: 45 hours (3 hours per week x 15 weeks in a semester) for individual question & discussion in the office, 16 hours (2 working days) for exercise preparation for the whole semester, 40 hours (5 working days) for mid –term test and seminar assessment/ grading, 24 hours (3 working days) for final exam assessment/ grading, further 20 working days for material/ reference reading for updating the syllabus and lecture contents, 30 working days for experiment/ study for self enhancement on the teaching qualification (experiences and skills)</i></p>
Credit points (số tín chỉ)	3
Required and recommended prerequisites for joining the module (những yêu cầu kiến thức trước khi học)	N/A

⁶ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

<p>Module objectives/intended learning outcomes (Mục tiêu môn học, yêu cầu CDR)</p>	<p><i>Key question: what learning outcomes should students attain in the module</i></p> <p><i>After completing the course, students could (learning outcomes)</i></p> <ul style="list-style-type: none"> - <i>Gain the basic knowledge on ecology and environment, and the transformation of energy and materials in ecosystems</i> - <i>Be able to analyze and predict the ecological alteration upon human impacts</i> - <i>Be able to improve the soft skills (present, discuss and work together,...)</i>
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Content (Nội dung)	<p><i>The description of the contents should clearly indicate focus areas and the level of difficulty.</i></p>
	<p>Introduction to the course</p> <p>Chapter 1: Introduction to ecology – General definitions</p> <p>Basic definitions</p> <p>History of ecology</p> <p>Ecology and its applications on environmental protection and human lives</p> <p>Methods in ecological studies</p> <p>Chapter 2: Environmental parameters: the limit factors of ecosystem</p> <p>Environment and ecofactors</p> <p>Influences of environmental factors on organisms and their adaptation</p> <p>Reaction of organisms to the environmental parameters</p> <p>Relationship between the different organisms in ecosystem</p> <p>Chapter 3: Autecology, polupation and community ecology</p> <p>Biological cycles</p> <p>Population</p> <p>Community</p> <p>Case studies of experts about ecology</p> <p>Chapter 4: Ecosystem</p> <p>Definition and components of an ecosystem</p> <p>Ecosystem function</p>

	<p>Ecosystem statuses</p> <p>Ecosystem characteristics</p> <p>Distribution of ecosystem latitudinally</p> <p>Geo-chemical-biological cycles</p> <p>Organic decomposition and function of micro-organisms</p> <p>Chapter 5: Ecotoxicology</p> <p>Environmental degradation and ecological succession.</p> <p>Eutrophication</p> <p>Ecology and environment of wetland</p> <p>Challenges and ecological and environmental risks worldwide</p> <p>Group presentation / report</p>
<p>Exams and assessment formats (Hình thức kiểm tra và thi)</p>	<p>assignment, seminar (25 min of presentation; 15 – 20 min for question/ answer): 30%</p> <p>mid-term test (multiple choice, 50 min): 20%</p> <p>final examination (essay, 80 min): 50%</p>
<p>Study and examination requirements (Tỉ lệ đánh giá học tập)</p>	<p><i>Requirements for successfully passing the module</i></p> <p><i>Students must have a final grade of 50% or higher to pass; the final exam must be graded of not less than 3/10.</i></p>

<p>Reading list (Tài liệu)</p>	<p><i>Main material</i></p> <p>Peter Stiling, 2002. Ecology: theories and application, 4th Edition. Prentice-Hall of India Private Limited. New Delhi.</p> <p><i>Further readings</i></p> <p>Robert Welzel, 2001. Limnology : lake and river ecosystems, 3rd edition. Academic Press, San Diego</p> <p>Walker, C.H., Hopkin, S.P., Sibly, R.M., Peakall, D.B., 2006. Principles of Ecotoxicology. CRC Press, Taylor & Francis Group, U.S.</p> <p>Nguyễn Văn Tuyên, 1998. Ecology and Environment. Educational Publishing House of Hochiminh City.</p> <p>Vũ Trung Tạng, 2007. Fundamental of Ecology. Educational Publishing House of Hanoi.</p> <p>Lê Văn Khoa, Nguyễn Xuân Quýnh, Nguyễn Quốc Việt, 2007. Biological indicators for environment. Educational Publishing House of Hanoi.</p> <p>Đỗ Hồng Lan Chi, Bùi Lê Thanh Khiết, Đào Thanh Sơn, 2015. <i>Độc học Sinh thái</i>. NXB ĐHQG TP.HCM</p>
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Physio-Chemical & Chemical Processes in Environmental Engineering (EN2045)

Module designation	<i>Physio-Chemical & Chemical Processes in Environmental Engineering</i>
Semester(s) in which the module is taught (Học kỳ giảng dạy)	<i>4th semester</i>
Person responsible for the module	<i>Prof. Nguyen Van Phuoc, A/Prof. Nguyen Nhat Huy; Ms. Du My Le; Ms. Phan Xuan Thanh</i>
Language (ngôn ngữ)	<i>Vietnamese and English</i>
Relation to curriculum	<i>Compulsory Environmental Engineering</i>
Teaching methods	<i>Lecture, documentary films, in-class exercises, group discussion/ presentation/seminar</i>
Workload (incl. contact hours, self-study hours)	<ul style="list-style-type: none"> - (Estimated) Total workload: 42 hours (Theory: 30 hrs; Tutorial: 12 hrs) - Contact hours (lecture, exercise, etc.): 3 hrs/week - Private study including examination preparation, specified in hours: 76.5 hrs
Credit points	<i>3</i>
Required and recommended prerequisites for joining the module	<ul style="list-style-type: none"> - Pre-requisite course: N/A -Pre-course: General Chemistry CH1003); Chemistry for Environmental Engineering & Science (EN2031

Module objectives/intended learning outcomes	<p><i>Upon the completion of this course, students are able to achieve the following knowledge and skills:</i></p> <ul style="list-style-type: none"> - <i>Knowledge: Provide students with fundamental principles of physico-chemical/chemical processes occurring in natural and engineered systems. Undergraduate students will be able to evaluate species transport and transformations in these systems by mass transport, chemical kinetics, chemical equilibria and interfacial phenomena.</i> - <i>Skills: This knowledge will help student analyze and solve problems encountered in environmental engineering. Students are expected to be able to design and operate typical treatment units for air, water, and wastewater pollution control.</i> <p><i>Comptences: Students are expected to have the ability to predict trends in environmental quality changes to promptly propose technical solutions to protect the environment.</i></p>
Content	<ul style="list-style-type: none"> - <i>This subject introduces knowledge about (1) transport and transformation of contaminants in the environment, and (2) physico-chemical and chemical unit operations in environmental engineering.</i> <p><i>Students work in design teams and produce written and oral reports for a major design project.</i></p>
Exams and assessment formats	<ul style="list-style-type: none"> - <i>Exercise: homework, quizzes/exercises during class</i> - <i>Group exercise (group works with 3-4 students per group; Group presentation and reports).</i> - <i>Final exam: Writing test</i>
Study and examination requirements	<ul style="list-style-type: none"> - <i>In-class activities and homework sets: 30%</i> - <i>Seminar (group exercise and/or presentation): 20%</i> - <i>Final exam (writing, 90 minutes): 50%</i> <p><i>Students must have a final grade of 50% or higer to pass the course.</i></p>

<p>Reading list</p>	<p>Required textbooks and notes</p> <p>[1] Mark M. Benjamin and Desmond F. Lawler, <i>Water Quality Engineering: Physical/Chemical Treatment Process</i>, John Willey & Sons, 2013.</p> <p>[2] William W Nazaroff and Lisa Alvarez-Cohen, <i>Environmental Engineering Science</i>, John Willey & Sons, 2001.</p> <p>[3] Dư Mỹ Lệ, <i>Bài giảng môn học Các quá trình Hóa học và Hóa lý trong lĩnh vực kỹ thuật môi trường</i>, Bộ môn Kỹ thuật Môi trường, Khoa Môi trường, ĐHBK Tp.HCM (in Vietnamese).</p> <p>Supplementary textbooks:</p> <p>[4] Warren L. McCabe, <i>Unit Operations of Chemical Engineering, 7th Edition</i>, Mc.Graw Hill Inc., New York, 2005.</p> <p>[5] E.L. Cussler, <i>Diffusion – Mass transfer in Fluid Systems</i>, Cambridge, 2010.</p> <p>[6] Vũ Bá Minh, <i>Kỹ thuật phản ứng</i>, NXB Đại học Quốc gia Tp.HCM, 2020 (in Vietnamese).</p> <p>[7] Vũ Bá Minh, <i>Truyền Khối</i>, NXB Đại học Quốc gia Tp.HCM, 2020 (in Vietnamese)</p>
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Environmental Law and Policy (EN3033)

Module designation (Tên môn học)	<i>Environmental Law and Policy</i> (Luật và chính sách môi trường) – EN3033
Semester(s) in which the module is taught (Học kỳ giảng dạy)	
Person responsible for the module (Giảng viên)	<i>A/Prof. Lê Văn Khoa, MSc. Phạm Thị Thanh Thúy</i> <i>MSc. Nguyễn Thị Hiếu</i>
Language (ngôn ngữ)	<i>English / Vietnamese</i>
Relation to curriculum (Các môn học liên quan)	<i>Compulsory / elective / specialisation</i> <i>Names of other study programmes with which the module is shared</i>
Teaching methods (Phương pháp giảng dạy)	<ul style="list-style-type: none"> - <i>Power Point + Video Clip</i> - <i>Discussion (Thảo luận)</i> - <i>Group Work (Làm việc nhóm),</i> - <i>Group Presentation (Trình bày nhóm),</i> - <i>Play a role (Sắm vai)</i> - <i>Case Study (Giải quyết tình huống cụ thể)</i> - <i>Live stream – Online learning (Giảng dạy trực tuyến)</i> - <i>Practical Survey, Observation (Khảo sát thực tế)</i> - <i>Blended Teaching (Phối hợp giảng dạy với GV nước ngoài)</i>

Workload (incl. contact hours, self-study hours) (Thời lượng làm việc)	<i>(Estimated) Total workload: 45</i> <i>Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 03 hours /week</i> <i>Private study including examination preparation, specified in hours⁷: 135 hours</i>
Credit points (số tín chỉ)	03
Required and recommended prerequisites for joining the module (những yêu cầu kiến thức trước khi học)	

⁷ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

<p>Module objectives/intended learning outcomes</p> <p>(Mục tiêu môn học, yêu cầu CDR)</p>	<p><i>The objective of the course is to provide students with basic information and knowledge about laws, policies, and other legal bases for environmental protection and natural resource management in Vietnam and International; course learning will help students to build some skills, including: problem-solving; systems thinking; critical thinking; and effective teamwork & communication. And, students also know how to apply knowledge to benefit society.</i></p> <p><i>Mục tiêu của môn học nhằm cung cấp cho sinh viên các thông tin và kiến thức cơ bản về luật định, chính sách và các cơ sở pháp lý khác phục vụ cho công tác bảo vệ môi trường và quản lý tài nguyên thiên nhiên tại Việt Nam và Quốc tế; trong quá trình học tập môn học giúp sinh viên xây dựng các kỹ năng: Kỹ năng tư duy & giải quyết vấn đề; có tư duy tầm hệ thống; tư duy phản biện; và kỹ năng làm việc theo nhóm & giao tiếp hiệu quả. Sinh viên cũng biết áp dụng kiến thức để đem lại lợi ích cho xã hội.</i></p>
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<p>Content</p> <p>(Nội dung)</p>	<p><i>This course introduces the concepts of environmental protection governance, policy cycle: theory & practices in viet Nam; main contents of environmental protection law, environmental impact assessment, strategic environmental assessment, commitment of environmental protection, handling violation of the law in environmental protection; and other related legal basics such as: Forest resource, Mineral resource, Water resource. The course also introduces some key national strategies of environmental protection such as: Sustainable Development, Environmental Protection, Green Growth; and international regulations and conventions related to natural resources and environmental protection.</i></p> <p><i>Để đáp ứng mục tiêu, nội dung môn học giới thiệu các khái niệm quản lý nhà nước về bảo vệ môi trường (BVMT), chu trình hình thành chính sách: lý thuyết và thực tế tại Việt Nam; các nội dung chính của Luật BVMT, đánh giá tác động môi trường, đánh giá môi trường chiến lược và cam kết bảo vệ môi trường, xử lý vi phạm pháp luật trong lĩnh vực BVMT, các cơ sở pháp lý khác có liên quan như bảo vệ tài nguyên rừng, tài nguyên khoáng sản, tài nguyên nước. Môn học cũng giới thiệu về các chiến lược quốc gia về BVMT chính yếu như: Chiến lược quốc gia về Phát triển bền vững, Chiến lược quốc gia về BVMT, Chiến lược quốc gia về Tăng trưởng Xanh; và các quy định và công ước quốc tế về BVMT và tài nguyên.</i></p>
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Exams and assessment formats (Hình thức kiểm tra và thi)	<p><i>Group assignment + Oral Presentation (60 - 90'/assignment),</i></p> <p><i>One final exam (80 minutes),</i></p> <p><i>And home works (individual, group)</i></p> <p><i>Tiểu luận và trình bày nhóm (60 – 90 phút/tiểu luận)</i></p> <p><i>Thi cuối khóa (80 phút)</i></p> <p><i>Và bài tập ở nhà (cá nhân, nhóm)</i></p>
Study and examination requirements (Tỉ lệ đánh giá học tập)	<p><i>Evaluation form: Scale of 10; less than 5.5 does not pass; Assignment x 50% + Exam x 50%</i></p> <p><i>- Besides, participating actively in class (AIC), completing homeworks (HW) will be awarded points (not than 20% of exam scores).</i></p> <p>• <i>Conditions for taking the exam:</i></p> <ul style="list-style-type: none"> <i>- Attend more than 2/3 of the total number of lectures;</i> <i>- Prepare and report group assignment.</i> <p><i>Hình thức đánh giá: Thang điểm 10; dưới 5,5 là không đạt; Tiểu luận x50% + Thi x50%</i></p> <p><i>Ngoài ra, tham gia đóng góp tích cực bài giảng trên lớp (AIC), thực hiện đầy đủ các bài tập về nhà (HW) sẽ được tính điểm thưởng (không nhiều hơn 20% điểm thi).</i></p> <p>• <i>Điều kiện dự thi:</i></p> <ul style="list-style-type: none"> <i>- Tham dự trên 2/3 tổng số buổi giảng;</i> <i>-Thực hiện và báo cáo tiểu luận theo nhóm.</i>

<p>Reading list (Tài liệu tham khảo)</p>	<p>[1] Gregor Haberle (eds.), Hartmut Fritzsche et al. 2013. <i>Fachwissen Umwelttechnik</i> – (Bản tiếng Việt: Dương Minh Trí và cs dịch và hiệu đính). Chuyên ngành Kỹ thuật môi trường. Phương Nam Book. 2020.</p> <p>[2] Nguyễn Đăng Dung (chủ biên), 2021. <i>Chính trị học</i>. NXB Đại học Quốc gia Hà Nội.</p> <p>[3] Nguyễn Hồng Thao, Nguyễn Thị Xuân Sơn (đồng chủ biên), 2020. <i>Giáo trình Luật quốc tế về môi trường</i>. NXB Đại học Quốc gia Hà Nội.</p> <p>References/books: Law, policy, regulation, circular, national standards related to Natural resources and environmental protection in Vietnam and International.</p> <p>Tài liệu tham khảo: Luật, Chính sách, Quy định, Thông tư, Quy chuẩn về BVMT và tài nguyên của Chính phủ và các Bộ chuyên ngành</p>
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Environmental Modelling

Module designation (Tên môn học)	<i>Environmental Modelling</i> <i>(Mô hình hóa môi trường)</i>
Semester(s) in which the module is taught (Học kỳ giảng dạy)	<i>Semester 5</i> <i>(Học kỳ 5)</i>
Person responsible for the module (Giảng viên)	<i>Assoc. Prof. Bui Ta Long, Dr. Nguyen Thai Anh</i> <i>(PGS. TSKH. Bùi Tá Long)</i>
Language (Ngôn ngữ)	<i>Vietnamese, and English</i> <i>(Tiếng Việt và Tiếng Anh)</i>
Relation to curriculum (Các môn học liên quan)	<ul style="list-style-type: none"> - <i>Environmental Hydrology (Compulsory);</i> - <i>Air Pollution Control (Compulsory);</i> - <i>Water and Wastewater Treatment Technology (Compulsory);</i> - <i>Numerical Methods (Elective);</i> - <i>Fluid Mechanics (Elective).</i>
Teaching methods	<i>Lecture, lesson, laboratory works, and seminar.</i>
Workload (incl. contact hours, self-study hours)	<ul style="list-style-type: none"> - <i>Total workload hours: 60;</i> - <i>Total theory lecture hours: 30;</i> - <i>Total exercise, laboratory works, and seminar hours: 30.</i>
Credit points	<i>3 (2.2.5)</i>
Required and recommended prerequisites for joining the module (Những yêu cầu kiến thức trước khi học)	<ul style="list-style-type: none"> - <i>Numerical methods and mathematical models;</i> - <i>Knowledge of environmental processes;</i> - <i>Analysing, mining, and visualizing data;</i> - <i>Application of GIS and remote sensing for model.</i>

<p>Module objectives/ intended learning outcomes (Mục tiêu môn học, yêu cầu CDR)</p>	<p>Module objectives:</p> <ul style="list-style-type: none"> - <i>Knowledge: this course will provide students with basic knowledge and advanced applications of the mathematical model, the environmental modelling techniques in solving a huge urgent environmental problems, pay attention to the mathematical models appearing in water supply, wastewater, solid waste, air pollution simulation;</i> - <i>Skills: know how to use plenty of software that calculates the transmission and diffusion of environmental pollutants consisting of ModelMaker (kinetic equations), CAP (air environment), ENVIMAP (air environment), Streeter (water environment), QUAL2K (water environment) , MIKE11 (water environment);</i> - <i>Competences: Guide students to logical thinking skills, creativity, through the decision thinking, rational, responsible educational experience about the possible consequences when adopting decisions.</i> <p>Intended learning outcomes:</p> <ul style="list-style-type: none"> - <i>Modeling with the aid of information technology in current times has become a crucial branch of modern science and is a merely powerful tool to uncover the world. Research, modeling and applications on the computer opens up new horizons to identify the dependence of the mathematics and computer science and other disciplines - both natural and social;</i> - <i>Subject environment modelling provides a theoretical basis and practical construction as well as application of mathematical models for environmental protection. The basic concepts such as modeling, environmental modeling, modeling the environmental issues of air, surface water, ground water is</i>
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	<i>presented. Furthermore, it also devoted special attention to the specific application of environmental problems in our country.</i>
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<p>Content (Nội dung)</p>	<ul style="list-style-type: none"> - (1) Introduction: <ul style="list-style-type: none"> + Modeling natural processes including physical model, mathematical model, role of mathematical models, key attributes of the model; + Environmental Modeling including why have environmental modeling?, definition of environmental modeling, principles of environmental modeling, role of the environment forecast model, model classification by space and time. - (2) The basic concepts of environmental modelling and measurement systems for modelling service: <ul style="list-style-type: none"> + The basic concepts of environmental modelling; + The measurement system serves for environmental modelling; + The first example of mathematical models and mathematical models of environmental processes. - (3) The meteorological factors affecting the dispersion of pollution: <ul style="list-style-type: none"> + The emission of air pollutants in the atmosphere; + The condition affects the dispersal of atmospheric gases; + Steady state of the atmosphere. - (4) Modelling air pollution according the Gauss approach: <ul style="list-style-type: none"> + Basic equations describing the transmission and diffusion of pollutants; + Basic Gauss model and estimate change dispersion of pollutants; + Calculate the average air pollution level over time; + Exercises in terms of simulation applying Gauss method. - (5) Modeling air pollution Berliand approach: <ul style="list-style-type: none"> + The approach to estimate the air pollution dispersion;
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	<ul style="list-style-type: none"> + <i>Berliand model for calculating dispersion of pollution;</i> + <i>The steps automated calculation of air pollution in the model.</i> - (6) Model of Streeter in simulating river water quality: <ul style="list-style-type: none"> + <i>The basic concepts associated with the Streeter model;</i> + <i>The equation decomposes organic matter superlative;</i> + <i>The phenomenon of gas permeability & gas permeability modeling;</i> + <i>Establishing the Streeter equation;</i> + <i>Solutions the Streeter equations and calculate for the specific case;</i> + <i>The extended Streeter model;</i> + <i>Exercises in terms of applying the Streeter model.</i> - (7) Qual2K Model: <ul style="list-style-type: none"> + <i>Overview of QUAL2K model;</i> + <i>The segment in QUAL2K model;</i> + <i>Balancing flow;</i> + <i>The hydraulic properties;</i> + <i>Moving time;</i> + <i>The formula for calculating the coefficient of dispersion in the direction of flow;</i> + <i>Temperature model;</i> + <i>Model calculations for the element;</i> + <i>Software ENVIMQ2K applying GIS to simulation river water quality;</i> + <i>Exercise ENVIMQ2K software applications to simulation river channel water quality by discharge sources.</i>
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Exams and assessment formats (Hình thức kiểm tra và thi)	<ul style="list-style-type: none"> - <i>Take-home written assignments;</i> - <i>Mid-term test: written examination, time: 45 minutes;</i> - <i>Final exam: written examination, time: 90 minutes.</i>
Study & examination requirements (Tỉ lệ đánh giá học tập)	<p><i>The final grade in the module is composed of:</i></p> <ul style="list-style-type: none"> - <i>10% in-class participation: students need to attend a minimum of 80% hours of coursework;</i> - <i>20% take-home assignments: report must be submitted by the student group;</i> - <i>20% performance on mid-term test;</i> - <i>50% performance on final exam.</i>
Reading list (Tài liệu)	<p><i>Names of textbooks:</i></p> <ul style="list-style-type: none"> - <i>Environmental Modelling (2014);</i> - <i>Practical Exercises for Environmental Modelling (2014);</i> <p><i>Names of reference books:</i></p> <ul style="list-style-type: none"> - <i>Fundamentals of Ecological Modelling, 4th Edition (1994);</i> - <i>Environmental Modeling: Fate and Transport of Pollutants in Water, Air, and Soil (1996);</i> - <i>Surface Water-Quality Modeling (1997);</i> - <i>Air pollution and exhaust gas treatment: Volume 1 - Air Pollution and Computation for Pollutants Diffusion (2002);</i> - <i>Geodesy and Revise Hydrological Data (2003).</i>

Microbiology

Module designation	<i>Microbiology</i>
Semester(s) in which the module is taught	<i>Semester 2</i>
Person responsible for the module	<i>Assoc. Prof. Dang Vu Bich Hanh</i>
Language	<i>Vietnamese, English</i>
Relation to curriculum	<ul style="list-style-type: none"> - <i>Biological processes in environmental engineering (required)</i> - <i>Wastewater treatment engineering (required)</i> - <i>Solid waste engineering (required)</i> <p><i>Names of other study programmes with which the module is shared (Environmental Engineering program; Natural Resources and Management)</i></p>
Teaching methods	<i>lecture, lab works, presentation, blended course</i>
Workload (incl. contact hours, self-study hours)	<p><i>(Estimated) Total workload: 39 hr of lecture</i></p> <p><i>27 hr assignment</i></p> <p><i>30 lab works</i></p> <p><i>135 hrs of self study</i></p>
Credit points	<i>4</i>
Required and recommended prerequisites for joining the module	<p><i>Basic knowledge on:</i></p> <ul style="list-style-type: none"> - <i>General chemistry</i>
Module objectives/intended learning outcomes	<ul style="list-style-type: none"> - <i>Understand and identify groups in microbes kingdom and taxonomic skills.</i> - <i>Understand biochemical reactions in intra and extracellular.</i>

	<ul style="list-style-type: none"> - <i>Develop skills for analysis, argument and identify metabolic substances in environment</i> - <i>Analyze and evaluate role of microbes in pollution treatment and monitoring</i> - <i>Practical skills and knowledge opening</i>
Content	<ul style="list-style-type: none"> - Students understand a basic general knowledge of structures, habitats and characteristics of microorganism in environment; principles of microbial metabolism and microbes influences all living thing in environment and safety in microbial lab working. - How to analyze and apply the biological processes in the environmental technologies and environmental management or fundamental biotechnology, as well
Exams and assessment formats	<ul style="list-style-type: none"> - <i>Class work activities/ Quizzes; Take – home written assignments; Lab work with report; Final examination in quizzes.</i>
Study and examination requirements	<p><i>Requirements for successfully passing the module</i></p> <p><i>The final grade in the module is composed of 30% performance on exams, 10% quizzes, 20% take-home assignments, 40% in-class participation. Students must have a final grade of 50% or higher to pass</i></p>
Reading list	<ul style="list-style-type: none"> - <i>Handbook of Water and Wastewater Microbiology – Duncan Mara and Nigel Horan – Academic Press – 2003</i> - <i>Principles and Practice of Disinfection, Preservation & Sterilization - Russell, Hugo & Ayliffe's – Black Well Publishing – 2004</i>

Module Handbook for Course on Solid Waste Treatment Engineering (EN3027)

Module designation	<i>Solid Waste Treatment Engineering (EN3027)</i>
Semester(s) in which the module is taught	2
Person responsible for the module	<i>Prof. Nguyen Van Phuoc, Dr. Ngo Thi Ngoc Lan Thao, MSc. Duong Thi Thanh</i>
Language	<i>Vietnamese</i>
Relation to curriculum	<i>Compulsory (specialisation) Environmental Engineering</i>
Teaching methods	<i>Lecture, documentary films, group works/discussion/presentation.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 60 hours (theory: 39, Experiment: 15 assignment: 6, and homework) Contact hours: 3 hrs/week Private study including examination preparation, specified in hours: 80 hrs</i>
Credit points	3
Required and recommended prerequisites for joining the module	<i>Pre-requisite course: N/A Pre-courses Chemistry for Environmental Engineering and Science 1 (EN2005), & 2 (EN2041) , Biological Processes in Environmental Engineering (EN2003)) Parallel courses Water Treatment Engineering (EN3005)</i>

<p>Module objectives/intended learning outcomes</p>	<p><i>Upon the completion of this course, students are able to achieve the following knowledge and skills:</i></p> <ul style="list-style-type: none"> - <i>Knowledge: i) Definitions of solid waste including municipal, hospital and industrial solid waste; legal issues and requirements for solid waste management and health and environmental issues related to solid waste management, ii) Understanding of problems of municipal waste, biomedical waste, hazardous waste, industrial waste et. iii) Understand engineering, financial and technical options for Solid Waste Treatment Engineering</i> - <i>Skills: (i) Develop skills for technologies that deal with transforming waste into Resources; ii) analysis and argument of waste flows in domestic and industrial process iii) analysis and argument of factors influencing the volume or the mass of the solid waste (iv) Teamwork and multidisciplinary cooperation.</i> - <i>Competences: (i) Apply knowledge to Analyse and evaluate treatment and disposal techniques for solid wastes– composting, vermin-composting, incineration, nonincineration thermal techniques, use of refuse derived fuels, land fill.</i>
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Content	<ul style="list-style-type: none"> - <i>Sources, composition of solid and hazardous waste.</i> - <i>Quantity, characteristic of solid and hazardous waste.</i> - <i>Storage and collecting system of solid and hazardous waste.</i> - <i>Transportation system of solid and hazardous waste.</i> - <i>Recycle and treatment technologies</i> - <i>Method of solid and hazardous waste treatment</i> - <i>Technology of solid and hazardous waste treatment</i> - <i>Students have the vision toward zero emission and are able to apply the circular economic concept to waste management</i>
Exams and assessment formats	<ul style="list-style-type: none"> - <i>One (01) Individual assignment : students work in weeks and submit in the every week from week 2 to10 of the course.</i> - <i>One (01) Group Works: each group consists of 4-5 students, choose their own topic from week 2. Group presentation in week 13 for about 30 minutes. Assessment of each group is based on an agreed rubric.</i> - <i>One (01) Mid-term exam (week 7)</i> - <i>One (01) final exam: Based and calculation.</i>

Study and examination requirements	<ul style="list-style-type: none"> - <i>All materials (lecture handouts, article papers, reports and case studies) are provided on BK-elearning (BKeL).</i> - <i>Students are required to be at least 90% attendance of theoretical lectures and 100% of individual assignments, discussion, presentation of the course.</i> - <i>Students must do homework Individual assignment.</i> - <i>Students must Experiment 5 week</i> - <i>Group works presentation will be performed in Week 13 – 14. Assessment Rubrics for group presentation will be discussed in Week 1 of the course.</i> - <i>The final grade includes Individual assignment (10%); Experiment (20%) group presentation (20%); final exam (50%).</i> - <i>Students must have a final grade of 50% or higher to pass the course.</i> - <i>Students do not submit Individual assignment and do not Experiment and do not participate group presentation will not be allowed to participate the final exam.</i>
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<p>Reading list</p>	<p><i>Textbook and main readings:</i></p> <p><i>[1] Tchobanoglous. G, Theisen.H, and Samel.V- Integrated Solid Waste Management, New York: McGraw-Hill, Inc., 1993.</i></p> <p><i>[2] Nguyễn Văn Phước- Quản lý và xử lý chất thải rắn, Nhà xuất bản Đại học Quốc gia TP. HCM, 2007.</i></p> <p><i>[3] Freeman H.M. (1988) Standard Handbook of Hazardous Waste Treatment and Disposal, New York, McGraw-Hill</i></p> <p><i>[4] Ruohomaa, H., Ivanova, N., 2019. From solid waste management towards the circular economy and digital driven symbiosis, IOP Conference Series: Earth and Environmental Science.</i></p> <p><i>[5] Malinauskaite, J, et.al. 2017, Municipal solid waste management and waste-to - energy in the context of a circular economy and energy recycling in Europe, Energy.</i></p> <p><i>[6] Malinauskaite, J., 2017. Municipal solid waste management and waste-toenergy in the context of a circular economy and energy recycling in Europe, Energy.</i></p>
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Module Handbook for Course on Water Treatment Engineering (EN3005)

Module designation	<i>Water Treatment Engineering (EN3005)</i>
Semester(s) in which the module is taught	<i>5 and 6 (depending on selection and enrolment of students)</i>
Person responsible for the module	<i>Prof. Nguyen Van Phuoc, Associate Professor Dang Viet Hung, Dr. Nguyen Thai Anh, Dr. Phan Thanh Lam</i>
Language	<i>Vietnamese and English</i>
Relation to curriculum	<i>Compulsory (specialisation) Environmental Engineering</i>
Teaching methods	<i>Lecture, documentary films, group works/discussion/presentation.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 87 hours (theory: 39, Lab's work: 30, assignment: 18) Contact hours: 3 hrs/week Private study including examination preparation, specified in hours: 25 hrs</i>
Credit points	<i>4</i>
Required and recommended prerequisites for joining the module	<ul style="list-style-type: none"> - <i>Pre-requisite course: N/A</i> - <i>Pre-courses: Analytical Chemistry (CH2009), Chemistry for Environmental Engineering 1 (EN2005), Physico-Chemical Processes in Environment (EN2045), Biological Processes in Environmental Engineering (EN2003)</i> - <i>Parallel courses: N/A</i>

Module objectives/intended learning outcomes	<p><i>Upon the completion of this course, students are able to achieve the following knowledge and skills:</i></p> <ul style="list-style-type: none"> - <i>Knowledge: (i) Understand and explain the significance and important role of water treatment engineering (WTE); (ii) Understand and analyse steps of water treatment process; (iii) Identify and analyze the characteristics of raw water, (iv) Design and operate the water treatment system.</i> - <i>Skills: (i) Develop skills for doing WTE experiments in Lab, design the water treatment process; (ii) Teamwork and multidisciplinary cooperation.</i> - <i>Competences: (i) Design and operate the water treatment units; and (ii) Analyse and evaluate the effectiveness of water treatment process.</i>
Content	<p><i>The purpose of this course is to provide students with following topics:</i></p> <ul style="list-style-type: none"> - <i>Principle and design calculation of physical treatment processes (sedimentation, flotation, screening).</i> - <i>Principle and design calculation of chemical treatment processes (chemical solution dosing, pH adjustment, precipitation, coagulation and flocculation, oxidation and reduction, disinfection).</i> - <i>Principle and design calculation of sorption processes (adsorption, ion exchange).</i> - <i>Principle and design calculation of membrane processes (MF, NF, RO).</i> - <i>Experiments on primary treatment, biological treatment.</i>

Exams and assessment formats	<p><i>The final grade includes process evaluation, lab experiments and final exam.</i></p> <ul style="list-style-type: none"> - <i>Process evaluation (25%)</i> <ul style="list-style-type: none"> ▪ <i>Essay (Group Works): each group consists of 4-5 students, choose their own topic from week 2. Group presentation in the 7th week for about 30 minutes. Assessment of each group is based on an agreed rubric.</i> ▪ <i>Assignment (Individual exercise): students work in 6 weeks and submit in the 9th week of the course.</i> - <i>Lab experiments (25%)</i> - <i>Final exam (50%)</i>
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Study and examination requirements	<ul style="list-style-type: none"> - <i>All materials (lecture handouts, article papers, reports and case studies) are provided on BK-elearning (BKeL).</i> - <i>Students are required to be at least 90% attendance of theoretical lectures and 100% of individual assignments, discussion, presentation of the course.</i> - <i>Students are provided with ideas of individual essay's topics in Week 2 of the course. Individual essays should be submitted in Week 9. Maximum length of the essay is 2,500 words (excluded tables, diagrams, figures).</i> - <i>Group works presentation will be performed in Week 7 – 10. Assessment Rubrics for group presentation will be discussed in Week 1 of the course.</i> - <i>Students must have a final grade of 50% or higher to pass the course.</i> - <i>Students do not submit individual assignment and do not participate group presentation will not be allowed to participate the final exam.</i>
Reading list	<p><i>Textbook and main readings:</i></p> <p><i>[1] Kerry J. Howe_David W. Hand_John C. Crittenden_R. Rhodes Trussell_George Tchobanoglous, Principles of Water Treatment, John Wiley & Sons, Inc, 2012.</i></p> <p><i>[2] Mackenzie L. Davis, Water and wastewater engineering, Mc Graw Hill, 2010.</i></p> <p><i>Additional readings:</i></p> <p><i>[3] Nguyễn Ngọc Dung, Xử lý nước cấp, Nhà xuất bản Xây dựng, 1999.</i></p> <p><i>[4] Trung tâm đào tạo ngành nước & môi trường, Sổ tay xử lý nước, Nhà xuất bản Xây dựng, 1999</i></p>

Module Handbook for Course on Wastewater Treatment Engineering (EN3013)

Module designation	<i>Wastewater Treatment Engineering (EN3013)</i>
Semester(s) in which the module is taught	<i>5 and 6 (depending on selection and enrolment of students)</i>
Person responsible for the module	<i>Prof. Nguyen Van Phuoc, Associate Professor Dang Viet Hung, Dr. Nguyen Thai Anh, Dr. Phan Thanh Lam</i>
Language	<i>Vietnamese and English</i>
Relation to curriculum	<i>Compulsory (specialisation) Environmental Engineering</i>
Teaching methods	<i>Lecture, documentary films, group works/discussion/presentation.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 81 hours (theory: 42, Lab's work: 30, assignment: 9) Contact hours: 3 hrs/week Private study including examination preparation, specified in hours: 25 hrs</i>
Credit points	<i>4</i>
Required and recommended prerequisites for joining the module	<ul style="list-style-type: none"> - <i>Pre-requisite course: N/A</i> - <i>Pre-courses: Analytical Chemistry (CH2009), Chemistry for Environmental Engineering 1 (EN2005), Physico-Chemical Processes in Environment (EN2045), Biological Processes in Environmental Engineering (EN2003)</i> - <i>Parallel courses: N/A</i>

Module objectives/intended learning outcomes	<p><i>Upon the completion of this course, students are able to achieve the following knowledge and skills:</i></p> <ul style="list-style-type: none"> - <i>Knowledge: (i) Understand and explain the significance and important role of wastewater treatment engineering (WWTE); (ii) Understand and analyse steps of wastewater treatment process; (iii) Identify and analyze the characteristics of untreated wastewater, (iv) Design and operate the wastewater treatment system.</i> - <i>Skills: (i) Develop skills for doing WWTE experiments in Lab, design the wastewater treatment process; (ii) Teamwork and multidisciplinary cooperation.</i> - <i>Competences: (i) Design and operate the wastewater treatment units; and (ii) Analyse and evaluate the effectiveness of wastewater treatment process.</i>
Content	<p><i>The purpose of this course is to provide students with following topics:</i></p> <ul style="list-style-type: none"> - <i>Principle and design calculation of primary treatment.</i> - <i>Principle and design calculation of biological treatment (aerobic, nitrification, denitrification, biofilm attached growth process).</i> - <i>Principle and design calculation of sludge treatment.</i> - <i>Experiments on primary treatment, biological treatment.</i>

Exams and assessment formats	<p><i>The final grade includes process evaluation, lab experiments and final exam.</i></p> <ul style="list-style-type: none"> - <i>Process evaluation (25%)</i> <ul style="list-style-type: none"> ▪ <i>Essay (Group Works): each group consists of 4-5 students, choose their own topic from week 2. Group presentation in the 7th week for about 30 minutes. Assessment of each group is based on an agreed rubric.</i> ▪ <i>Assignment (Individual exercise): students work in 6 weeks and submit in the 9th week of the course.</i> - <i>Lab experiments (25%)</i> - <i>Final exam (50%)</i>
Study and examination requirements	<ul style="list-style-type: none"> - <i>All materials (lecture handouts, article papers, reports and case studies) are provided on BK-elearning (BKeL).</i> - <i>Students are required to be at least 90% attendance of theoretical lectures and 100% of individual assignments, discussion, presentation of the course.</i> - <i>Students are provided with ideas of individual essay's topics in Week 2 of the course. Individual essays should be submitted in Week 9.</i> - <i>Group works presentation will be performed in Week 7 – 10. Assessment Rubrics for group presentation will be discussed in Week 1 of the course.</i> - <i>Students must have a final grade of 50% or higher to pass the course.</i> - <i>Students do not submit individual assignment and do not participate group presentation will not be allowed to participate the final exam.</i>

<p>Reading list</p>	<p><i>Textbook and main readings:</i></p> <p>[1] <i>Wastewater Engineering: Treatment and Resource Recovery Fifth Edition, Mecalff and Eddy, McGraw-Hill Education, 2014.</i></p> <p>[2] <i>Water and wastewater Engineering, Design Principles and Practice, Mackenzie L. Davis, McGraw-Hill Companies, 2010.</i></p> <p><i>Additional readings:</i></p> <p>[3] <i>Lam Minh Triet, Tran Hieu Nhue (2015). Wastewater treatment.</i></p>
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Module Handbook – Introduction to Engineering

Module designation (Tên môn học)	Introduction to Engineering
Semester(s) in which the module is taught (Học kỳ giảng dạy)	<i>1st semester</i>
Person responsible for the module	<i>Dr. Lam Van Giang</i> <i>Dr. Ha Quang Khai, Dr. Vo Thanh Hang</i>
Language (ngôn ngữ)	<i>English; Vietnamese</i>
Relation to curriculum (Các môn học liên quan)	
Teaching methods (Phương pháp giảng dạy)	<i>e.g. lecture, lesson, lab works, project, seminar etc.</i>
Workload (incl. contact hours, self-study hours) (Thời lượng làm việc)	<i>(Estimated) Total workload: 60</i> <i>Contact hours (please specify whether lecture, exercise, laboratory session, etc.):</i> <i>Private study including examination preparation, specified in hours¹:</i>
Credit points (số tín chỉ)	3
Required and recommended prerequisites for joining the module (những yêu cầu kiến thức trước khi học)	

Module objectives/intended learning outcomes (Mục tiêu môn học, yêu cầu CDR)	<p>Upon the completion of the course, students are able to achieve the following knowledge and skills:</p> <p>Understand issues in the area of environmental engineering and management;</p> <p>Understand required fundamental knowledge in the field of environment and natural resources;</p> <p>Develop and formulate personal skills; Develop attitudes for future career;</p> <p>Form effective teamwork and communications;</p> <p>Understand contemporary issues in the area of environment and resources.</p>
Content (Nội dung)	<p>This course will provide students with essential and crucial skills for engineers, including:</p> <p>The first part: information on and knowledge of engineer's duties and roles; effective learning ways in university.</p> <p>The second part: crucial skills, including: teamwork/group working; critical thinking; inter-personal communication skills; experiment and survey design; professional report composing.</p> <p>The third part: professional ethics and responsible behavior to learners in the field of natural resources and environmental management – environmental engineering for which they pursue to work.</p>

¹ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Exams and assessment formats (Hình thức kiểm tra và thi)	<ul style="list-style-type: none"> - <i>Midterm assessments (45 minutes each)</i> - <i>and one final exam (70 minutes),</i> - <i>short computer-based quizzes,</i> - <i>take-home written assignments</i> - <i>Labworks</i>
Study and examination requirements (Tỉ lệ đánh giá học tập)	<p><i>Requirements for successfully passing the module</i></p> <ul style="list-style-type: none"> - <i>The final grade in the module is composed of 50% performance on exams, 5% quizzes, 5% take-home assignments, 5% in-class participation and pilot project 35%. Students must have a final grade of 50% or higher to pass</i>
Reading list (Tài liệu)	<p>[1]. Phạm Văn Toàn, Phạm Công Bằng (2014). Nhập môn về Kỹ thuật. Nhà xuất bản ĐHQG Tp.HCM.</p> <p>[2]. Nguyễn Văn Tuấn (2013). Từ nghiên cứu đến công bố: Kỹ năng mềm cho nhà khoa học. Nhà xuất bản tổng hợp Tp.HCM.</p> <p>[3]. Evans, D. and Gruba, P. (2005). How to Write a Better Thesis. 2nd Edition, Melbourne University Press.</p> <p>[4]. Lebrun, J-L. (2007). Scientific Writing: A Reader and Writer's Guide. World Scientific, New Jersey.</p> <p>[5]. Lipson, C. (2005). How to Write a BA Thesis: A Practical Guide from Your First Ideas to Your Finished Papers. Chicago, the University of Chicago Press.</p>

Module Handbook for Course on Study Trips Workshop (EN3055)

Module designation	<i>Study Trips Workshop (EN3055)</i>
Semester(s) in which the module is taught	5
Person responsible for the module	<i>Master Tran Doan Trang, Master Vo Thi Thanh Thuy, MSc. Phan Xuan Thanh, MSc. Luu Dinh Hiep</i>
Language	<i>Vietnamese and English</i>
Relation to curriculum	<i>Compulsory (specialisation) Environmental Engineering</i>
Teaching methods	<i>Practise-based learning</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 45 hours (Self-study)</i>
Credit points	1
Required and recommended prerequisites for joining the module	- <i>Pre-requisite course: N/A</i>
Module objectives/intended learning outcomes	- <i>This course will help students grasp and appearance to operate the waste treatment system in real environments, thereby supplementing the practical knowledge to the theory students have acquired at the university</i>
Content	- <i>This course is the practice course to help the students set a few waste treatments stations or activities of environmental management agencies. Then, students will be able to visualize his work in the future.</i>
Exams and assessment formats	- <i>Observation (30%)</i> - <i>Final Exam: Internship report (70%)</i>
Study and examination requirements	- <i>All materials (lecture handouts, article papers, reports and case studies) are provided on BK-elearning (BKEL).</i> - <i>The final grade includes individual Observation (30%) and Internship report (70%)</i> - <i>Students must have a final grade of 50% or higher to pass the course.</i>
Reading list	- <i>Depends on the actual place to visit</i>

Module Handbook for Course on Internship (EN3345)

Module designation	<i>Internship (EN3345)</i>
Semester(s) in which the module is taught	6
Person responsible for the module	<i>Master Vo Thi Thanh Thuy, MSc. Tran Doan Tran</i>
Language	<i>Vietnamese and English</i>
Relation to curriculum	<i>Compulsory (specialisation) Professional education Graduation Environmental Engineering</i>
Teaching methods	<i>Practise-based learning</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 100 hours (Self-study)</i>
Credit points	2
Required and recommended prerequisites for joining the module	- <i>Pre-requisite course: N/A</i>
Module objectives/intended learning outcomes	- <i>Able to do technical analysis and problem solving in the field of environment at the internship unit</i>
Content	- <i>This is the student's internship before the graduation project. The purpose of the off-campus internship is to help students learn, observe and participate in the operation of complete environmental treatment works, collect actual data of the treatment system for the purpose of environmental treatment. graduate thesis and access to jobs. The internship provides students with the essential skills and experience required before graduation, including: technical analysis and problem-solving skills, experimental and experimental investigation, and hypothesis testing. Theory and proof, the ability to think creatively, the ability to critically evaluate environmental engineering problems in practice, to apply learned knowledge to solve the required problems in reality. In addition, students will learn the social context, business and enterprise environment in practice, the ability to form ideas and build systems, design technological processes for environmental treatment according to Specific problems in practice at the internship unit.</i>
Exams and assessment formats	- <i>Midterm Exam: Questions and Answers (50 minutes) (50%)</i> - <i>Final Exam: Internship report (50%)</i>
Study and examination requirements	- <i>All materials (lecture handouts, article papers, reports and case studies) are provided on BK-elearning (BK-eL).</i> - <i>The final grade includes individual Midterm Exam: Questions and Answers (50 minutes) (50%) and Final Exam: Internship report (50%)</i> - <i>Students must have a final grade of 50% or higher to pass the course.</i>
Reading list	- <i>Depends on the actual place to visit</i>

Module Handbook – Air Pollution Control Engineering (EN3001/EN3002)

A Module Handbook or collection of module descriptions that is also available for students to consult should contain the following information about the individual modules:

Module designation (Tên môn học)	<i>Air Pollution Control Engineering</i>
Semester(s) in which the module is taught (Học kỳ giảng dạy)	<i>6th semester</i>
Person responsible for the module	<i>A/Prof. Nguyen Nhat Huy; Ms. Du My Le; Ms. Phan Xuan Thanh; Ms. Lam Pham Thanh Hien</i>
Language (ngôn ngữ)	<i>Vietnamese and English</i>
Relation to curriculum (Các môn học liên quan)	<i>Specialisation Environmental Engineering</i>
Teaching methods (Phương pháp giảng dạy)	<i>Lecture, documentary films, in-class exercises, group discussion/ presentation, seminar and Lab works</i>
Workload (incl. contact hours, self-study hours) (Thời lượng làm việc)	<ul style="list-style-type: none"> - <i>(Estimated) Total workload: 78 hours</i> - <i>(Theory: 30 hrs; Tutorial: 18 hrs; Labs: 30 hrs)</i> - <i>Contact hours (lecture, exercise, laboratory session, etc.): 3 hrs/week</i> - <i>Private study including examination preparation, specified in hours: 102 hrs</i>
Credit points (số tín chỉ)	<i>4</i>
Required and recommended prerequisites for joining the module (những yêu cầu kiến thức trước khi học)	<ul style="list-style-type: none"> - <i>Pre-requisite course: N/A</i> - <i>Pre-course: Chemistry for Environmental Engineering & Science (EN2031); Physio-chemical & Chemical Processes in Environmental Engineering (EN2045)</i>
Module objectives/intended learning outcomes (Mục tiêu môn học, yêu cầu CĐR)	<p><i>Upon the completion of this course, students are able to achieve the following knowledge and skills:</i></p> <ul style="list-style-type: none"> - <i>Knowledge: Understand knowledge of principles and methods of treatment of particles and air pollutants.</i> - <i>Skills: Students are able to apply theoretical knowledge for analysing methods of air pollution control treatment; and also cover with calculation and design skills for air pollution control. Practice in air pollution control (Lab session)</i> - <i>Comptences: Identify, understand and explain the demand air pollution control engineering and its socially meaningful roles at both global and local levels to meet the goal of sustainable development.</i>
Content (Nội dung)	<ul style="list-style-type: none"> - <i>This subject provides the students with advanced knowledge about (i) principles and techniques for control of particulate emission: Settling chambers, Cyclone Separators, Wet collectors, Fabric Filters, Electrostatic Precipitators; and (ii) analyze and understand techniques for gaseous control: Adsorption, Absorption and other methods.</i> - <i>Experiment on pilot-scale air pollution control devices: cyclone, baghouse, absorber, adsorber, and biofilter models.</i>

Exams and assessment formats (Hình thức kiểm tra và thi)	<ul style="list-style-type: none"> - Exercise: homework, quizzes/exercises during class - Experiment (group works with 3-4 students per group; Group presentation and reports). - Final exam: Writing test
Study and examination requirements (Tỉ lệ đánh giá học tập)	<ul style="list-style-type: none"> -The final grade includes in-class weekly exercises (20%); group assignment/seminar (10%); Lab-work (30%);and final exam (40%). - Students must have a final grade of 50% or higher to pass the course.
Reading list (Tài liệu)	<p>Required textbooks and notes</p> <p>[1] <i>Bài giảng môn học Kỹ thuật xử lý khí thải</i>, Dư Mỹ Lệ, Bộ môn Kỹ thuật Môi trường, Khoa Môi trường & Tài nguyên, ĐHBK.TpHCM (in Vietnamese).</p> <p>[2] <i>Air Pollution Control - A Design Approach, 3rd Edition</i>, C.David Cooper & F.C. Alley, 2005, Waveland Press, Inc., New York.</p> <p>[3] <i>Air Pollution Control and Design for Industry</i>, Paul N.Cheremisinoff, 2008, Marcel Dekker, Inc., New York.</p> <p>Supplementary textbooks:</p> <p>[4] <i>Fundamentals of Air Pollution, 4th Edition</i>, Daniel Vallero, 2008, Elsevier Inc., USA.</p> <p>[5] <i>Process Engineering and Design for Air Pollution Control</i>, Jaime Benítez, 1993, Prentice-Hall, Inc., Englewood Cliffs, New Jersey.</p> <p>[6] <i>Kỹ thuật xử lý chất thải công nghiệp</i>, PGS. TS. Nguyễn Văn Phước, 2005, NXB Đại học Quốc gia Tp.HCM (in Vietnamese).</p>

Module Handbook – Project: Air Pollution Control & Solid Waste Treatment Engineering (EN4027)

Module designation	<i>Project: Air Pollution Control & Solid Waste Treatment Engineering (EN4027)</i>
Semester(s) in which the module is taught	7
Person responsible for the module	<i>Ms. Duong Thi Thanh, Ms. Du MyLe, Ms. Phan Xuan Thanh, A/Prof. Dang Vu Bich Hanh, A/Prof. Nguyen Nhan Huy</i>
Language	<i>Vietnamese and English</i>
Relation to curriculum	<i>Specialisation Environmental Engineering</i>
Teaching methods	<i>Project-based Learning</i>
Workload (incl. contact hours, self-study hours)	<ul style="list-style-type: none"> - (Estimated) Total workload: 30 hrs (Tutorial: 15 hrs; Mid & End of module test: 15hrs) - Contact hours (questions or discussion): 3 hrs/week - Private study including examination preparation, specified in hours: 100 hrs
Credit points	2
Required and recommended prerequisites for joining the module	<ul style="list-style-type: none"> - Pre-requisite course: N/A - Pre-course: Air Pollution Control Engineering (EN3001/3002); Solid Waste Treatment Engineering (EN3027)
Module objectives/intended learning outcomes	<p><i>Upon the completion of this course, students are able to achieve the following knowledge and skills:</i></p> <ul style="list-style-type: none"> - Knowledge: (1) Project for air pollution control & treatment: The project will provide a suitable treatment solution for a specific emission source, perform the design calculations, and create technical drawings to illustrate the plan; <li style="padding-left: 40px;">and (2) Project for solid waste treatment: The objective of the solid waste treatment engineering project is to assist students in developing their specialized knowledge of solid waste treatment and assess environmental problems caused by the effects of solid waste on humans. - Skills: Students are able to apply theoretical knowledge for analysing, design, and setting goals and plans to complete tasks to meet air/solid pollution control and treatment goals. - Competences: Identify, understand and explain the demand air/solid pollution control engineering and its socially meaningful roles at both global and local levels to meet the goal of sustainable development.

Content	<p>- Project for air pollution control & treatment:</p> <p><i>The project will provide an overview of the causes, impacts, and approaches for addressing these emissions. The topics will look into the sources of hazardous emissions from the environment, including those from the industry, indoor and outdoor air pollutants. The project helps students apply basic knowledge learned about air pollution control and treatment to propose the suitable air pollution control systems, and develop their report-writing skills. Describe and present the design concepts.</i></p> <p>- Project for solid waste treatment:</p> <p><i>The purpose of the solid waste treatment engineering project is to provide students with the opportunity to apply their knowledge of energy recovery, landfill procedures, fertilizer production, and solid waste treatment to real-world situations, incineration and recycling techniques.</i></p>
Exams and assessment formats	<ul style="list-style-type: none"> - Project group working with a two-student project team (Group presentation and report/drawings). - Project report: Evaluation is based on the project report including submitted paper and design drawings. - Final exam: Defense of the project against the committee serves as the basis for evaluation.
Study and examination requirements	<ul style="list-style-type: none"> - The final grade includes Instructor's evaluation (50%); and Reviewer's evaluation (50%). - Students must have a final grade of 50% or higher to pass the course.

<p>Reading list</p>	<p>Textbook and main readings:</p> <p>- Project for air pollution control & treatment:</p> <p>[1]. <i>Bài giảng môn học Kỹ thuật xử lý khí thải, Bộ môn Kỹ thuật Môi trường</i>, Khoa Môi trường, ĐHBK Tp.HCM.</p> <p>[2]. C.David Cooper & F.C. Alley, <i>Air Pollution Control - A Design Approach, Second Edition</i>, 1994, Waveland Press, Inc., New York.</p> <p>[3]. Daniel Vallero, <i>Fundamentals of Air Pollution</i>, Fourth Edition, 2008, Elsevier Inc., USA.</p> <p>[4]. Jaime Benítez, <i>Process Engineering and Design for Air Pollution Control</i>, 1993, Prentice-Hall, Inc., Englewood Cliffs, New Jersey.</p> <p>[5]. Nguyễn Văn Phước, <i>Kỹ thuật xử lý chất thải công nghiệp</i>, 2005, NXB Đại học Quốc gia Tp.HCM.</p> <p>- Project for solid waste treatment:</p> <p>[1]. Eckenfelder, W. W. and Adams, C. E. <i>Process Design Techniques for Industrial Waste Treatment</i>, 1994.</p> <p>[2]. <i>Decision Maker's Guide To Solid Waste Management_Vol.II, Chapter 9: Landfill Disposal</i>, page 9-1 to 9-66.</p> <p>[3]. George Tchobanoglous – Hilary Theisen – Samuel A. Vigil, <i>Intergrated Solid Waste Management - Civil Engineer Series</i>, McGraw- Hill Inc., 1993.</p> <p>[4]. Members Of The Design Manual Review Committee, <i>Solid waste Landfill Design Manual</i>, Parametrix Inc., Publication No. 87-13.</p> <p>[5]. TCXDVN 261:2001, <i>Tiêu chuẩn xây dựng Việt Nam - Bãi chôn lấp chất thải rắn tiêu chuẩn thiết kế</i>. Nhà xuất bản xây dựng, 2002.</p> <p>Additional readings: Based on the instructors.</p>
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Module Handbook – Project: Air Pollution Control & Solid Waste Treatment Engineering (EN4027)

Module designation	<i>Project: Air Pollution Control & Solid Waste Treatment Engineering (EN4027)</i>
Semester(s) in which the module is taught	7
Person responsible for the module	<i>Ms. Duong Thi Thanh, Ms. Du MyLe, Ms. Phan Xuan Thanh, A/Prof. Dang Vu Bich Hanh, A/Prof. Nguyen Nhan Huy</i>
Language	<i>Vietnamese and English</i>
Relation to curriculum	<i>Specialisation Environmental Engineering</i>
Teaching methods	<i>Project-based Learning</i>
Workload (incl. contact hours, self-study hours)	<ul style="list-style-type: none"> - (Estimated) Total workload: 30 hrs (Tutorial: 15 hrs; Mid & End of module test: 15hrs) - Contact hours (questions or discussion): 3 hrs/week - Private study including examination preparation, specified in hours: 100 hrs
Credit points	2
Required and recommended prerequisites for joining the module	<ul style="list-style-type: none"> - Pre-requisite course: N/A - Pre-course: Air Pollution Control Engineering (EN3001/3002); Solid Waste Treatment Engineering (EN3027)
Module objectives/intended learning outcomes	<p><i>Upon the completion of this course, students are able to achieve the following knowledge and skills:</i></p> <ul style="list-style-type: none"> - Knowledge: (1) Project for air pollution control & treatment: The project will provide a suitable treatment solution for a specific emission source, perform the design calculations, and create technical drawings to illustrate the plan; <li style="padding-left: 40px;">and (2) Project for solid waste treatment: The objective of the solid waste treatment engineering project is to assist students in developing their specialized knowledge of solid waste treatment and assess environmental problems caused by the effects of solid waste on humans. - Skills: Students are able to apply theoretical knowledge for analysing, design, and setting goals and plans to complete tasks to meet air/solid pollution control and treatment goals. - Competences: Identify, understand and explain the demand air/solid pollution control engineering and its socially meaningful roles at both global and local levels to meet the goal of sustainable development.

Content	<p>- Project for air pollution control & treatment:</p> <p><i>The project will provide an overview of the causes, impacts, and approaches for addressing these emissions. The topics will look into the sources of hazardous emissions from the environment, including those from the industry, indoor and outdoor air pollutants. The project helps students apply basic knowledge learned about air pollution control and treatment to propose the suitable air pollution control systems, and develop their report-writing skills. Describe and present the design concepts.</i></p> <p>- Project for solid waste treatment:</p> <p><i>The purpose of the solid waste treatment engineering project is to provide students with the opportunity to apply their knowledge of energy recovery, landfill procedures, fertilizer production, and solid waste treatment to real-world situations, incineration and recycling techniques.</i></p>
Exams and assessment formats	<ul style="list-style-type: none"> - Project group working with a two-student project team (Group presentation and report/drawings). - Project report: Evaluation is based on the project report including submitted paper and design drawings. - Final exam: Defense of the project against the committee serves as the basis for evaluation.
Study and examination requirements	<ul style="list-style-type: none"> - The final grade includes Instructor's evaluation (50%); and Reviewer's evaluation (50%). - Students must have a final grade of 50% or higher to pass the course.

<p>Reading list</p>	<p>Textbook and main readings:</p> <p>- Project for air pollution control & treatment:</p> <p>[1]. <i>Bài giảng môn học Kỹ thuật xử lý khí thải, Bộ môn Kỹ thuật Môi trường</i>, Khoa Môi trường, ĐHBK Tp.HCM.</p> <p>[2]. C.David Cooper & F.C. Alley, <i>Air Pollution Control - A Design Approach, Second Edition</i>, 1994, Waveland Press, Inc., New York.</p> <p>[3]. Daniel Vallero, <i>Fundamentals of Air Pollution</i>, Fourth Edition, 2008, Elsevier Inc., USA.</p> <p>[4]. Jaime Benítez, <i>Process Engineering and Design for Air Pollution Control</i>, 1993, Prentice-Hall, Inc., Englewood Cliffs, New Jersey.</p> <p>[5]. Nguyễn Văn Phước, <i>Kỹ thuật xử lý chất thải công nghiệp</i>, 2005, NXB Đại học Quốc gia Tp.HCM.</p> <p>- Project for solid waste treatment:</p> <p>[1]. Eckenfelder, W. W. and Adams, C. E. <i>Process Design Techniques for Industrial Waste Treatment</i>, 1994.</p> <p>[2]. <i>Decision Maker's Guide To Solid Waste Management_Vol.II, Chapter 9: Landfill Disposal</i>, page 9-1 to 9-66.</p> <p>[3]. George Tchobanoglous – Hilary Theisen – Samuel A. Vigil, <i>Intergrated Solid Waste Management - Civil Engineer Series</i>, McGraw- Hill Inc., 1993.</p> <p>[4]. Members Of The Design Manual Review Committee, <i>Solid waste Landfill Design Manual</i>, Parametrix Inc., Publication No. 87-13.</p> <p>[5]. TCXDVN 261:2001, <i>Tiêu chuẩn xây dựng Việt Nam - Bãi chôn lấp chất thải rắn tiêu chuẩn thiết kế</i>. Nhà xuất bản xây dựng, 2002.</p> <p>Additional readings: Based on the instructors.</p>
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Module Handbook for Course on Project Water Treatment Engineering (EN3077)

Module designation	<i>Project Water Treatment Engineering (EN3077)</i>
Semester(s) in which the module is taught	6
Person responsible for the module	<i>Dr. Nguyen Thai Anh, Dr. Phan Thanh Lam, A/Prof. Nguyen Nhat Huy, MSc. Phan Xuan Thanh, MSc. Duong Thi Thanh</i>
Language	<i>Vietnamese and English</i>
Relation to curriculum	<i>Compulsory (specialisation) Environmental Engineering</i>
Teaching methods	<i>Project-based learning, Blended learning, Research-based learning.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 90 hours (assignment: 90) Contact hours: 3 hrs/week Private study including examination preparation, specified in hours: 25 hrs</i>
Credit points	2
Required and recommended prerequisites for joining the module	<ul style="list-style-type: none"> - <i>Pre-requisite course: Water Treatment Engineering (EN3005), Wastewater Treatment Engineering (EN3013)</i> - <i>Pre-courses: N/A</i> - <i>Parallel courses: N/A</i>
Module objectives/intended learning outcomes	<p><i>The project is not only a technical report but also ensures the knowledge and interpretation capacity of the students about the technical characteristics. Upon the completion of this course, students are able to achieve the following knowledge and skills:</i></p> <ul style="list-style-type: none"> - <i>Knowledge: (i) Understand and explain the factory overview including production process, mass balance, properties of raw water and untreated wastewater. (ii) Understand and analyse steps of water and wastewater treatment process; (iii) Identify and analyze diagram of water and wastewater treatment technology, (iv) Design and operate the water and wastewater treatment system.</i> - <i>Skills: (i) Develop skills for technical calculating and selecting the technical parameters, design major units; (ii) Teamwork and multidisciplinary cooperation.</i> - <i>Competences: (i) Design, operate, estimate cost of the water and wastewater treatment units; and (ii) Analyse and evaluate the effectiveness of water and wastewater treatment process.</i>
Content	<p><i>The purpose of this course is to train students to do following works:</i></p> <ul style="list-style-type: none"> - <i>Introduction about production process of the factory</i> - <i>Review on wastewater treatment method and technology.</i> - <i>Selection and description diagram of water and wastewater treatment technology.</i> - <i>Technical calculation and design</i> - <i>Cost estimation and evaluate the effectiveness of the selected technology</i> - <i>Oral presentation</i>

Exams and assessment formats	<p><i>The final grade determined by process evaluation and final evaluation.</i></p> <ul style="list-style-type: none"> - <i>Process evaluation (50%) conducted by mentor</i> - <i>Final evaluation (50%) conducted by review board</i>
Study and examination requirements	<ul style="list-style-type: none"> - <i>All guidances are provided on BK-elearning (BKeL).</i> - <i>Students are required to be at least 90% attendance of group discussion.</i> - <i>Students do not submit technical report and do not participate group discussion will not be allowed to participate the final evaluation.</i>
Reading list	<p><i>Textbook and main readings:</i></p> <p><i>[1] Wastewater Engineering: Treatment and Resource Recovery Fifth Edition, Mecalf and Eddy, McGraw-Hill Education, 2014.</i></p> <p><i>[2] Water and wastewater Engineering, Design Principles and Practice, Mackenzie L. Davis, McGraw-Hill Companies, 2010.</i></p> <p><i>Additional readings:</i></p> <p><i>[3] Lam Minh Triet, Tran Hieu Nhue (2015). Wastewater treatment.</i></p>

3. Module Handbooks for Elective Subjects

3.1 Elective Subjects - Group A&B

Module Handbook for Aquatic biota and environmental management (EN3051)

Module designation (Tên môn học)	Aquatic biota and environmental management (EN3051)
Semester(s) in which the module is taught (Học kỳ giảng dạy)	181, 192, 211
Person responsible for the module	<i>Đào Thanh Sơn</i>
Language (ngôn ngữ)	<i>Vietnamese and English</i>
Relation to curriculum (Các môn học liên quan)	<i>Compulsory / elective / specialisation</i> <i>Ecology (EN1005), Chemical analysis (CH1009)</i> <i>Names of other study programmes with which the module is shared</i>
Teaching methods (Phương pháp giảng dạy)	<i>Lecture, seminar, exercise, group discussion, video clip illustration, etc.</i>

Workload (incl. contact hours, self-study hours) (Thời lượng làm việc)	<p><i>(Estimated) Total workload: 91,3 units (1 unit ~ 60 min)</i></p> <p><i>Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 27 units for lecture (theory), 9 units for seminar during class</i></p> <p><i>Private study including examination preparation, specified in hours⁸: 30 hours (2 hours per week x 15 weeks in a semester) for individual question & discussion in the office, 12 hours (1.5 working days) for exercise preparation for the whole semester, 32 hours (3 working days) for mid –term test and seminar assessment/ grading, 16 hours (2 working days) for final exam assessment/ grading, further 15 working days for material/ reference reading for updating the syllabus and lecture contents, 30 working days for experiment/ study for self enhancement on the teaching qualification (experiences and skills)</i></p>
Credit points (số tín chỉ)	2
Required and recommended prerequisites for joining the module (những yêu cầu kiến thức trước khi học)	N/A

⁸ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

<p>Module objectives/intended learning outcomes (Mục tiêu môn học, yêu cầu CDR)</p>	<p><i>Key question: what learning outcomes should students attain in the module</i></p> <p><i>After completing the course, students could (learning outcomes)</i></p> <ul style="list-style-type: none"> - Master the knowledge on environmental parameters relating to the lives of organisms in water bodies - Know the main and important groups of organisms in water bodies - Know how to describe, analyse, and evaluate the environmental data and organisms - Be able to apply the hydrobiological knowledge into the practice - Be able to present, discuss and group working - Master the knowledge on pollutants and their impacts on living things
<p>Content (Nội dung)</p>	<p><i>The description of the contents should clearly indicate focus areas and the level of difficulty.</i></p> <p>Introduction to the course</p> <p>Chapter 1: Origin, distribution and characteristics of water bodies</p> <p>Chapter 2: Phytoplankton community</p> <p>Chapter 3: Zooplankton community</p> <p>Chapter 4: Communities of zoobenthos and fish</p> <p>Chapter 5: Aquatic macrophytes</p> <p>Chapter 6: Pollutants in water environment and aquatic organisms</p> <p>Chapter 7: Evaluation, mitigation the pollutants and environmental management</p>

Exams and assessment formats (Hình thức kiểm tra và thi)	assignment, seminar (25 min of presentation; 15 – 20 min for question/ answer): 30% mid-term test (multiple choice, 50 min): 20% final examination (essay, 50 min): 50%
Study and examination requirements (Tỉ lệ đánh giá học tập)	<i>Requirements for successfully passing the module</i> <i>Students must have a final grade of 50% or higher to pass; the final exam must be graded of not less than 3/10.</i>

<p>Reading list (Tài liệu)</p>	<p><i>Main material</i></p> <p>Wetzel, 2001. Limnology: Lake and River Ecosystem. Academic Press</p> <p>Horne, A.J., Goldman, C.R., 1994. Limnology. McGraw-Hill</p> <p><i>Further readings</i></p> <p>O’Sullivan, P.E., Reynolds, C.S., 2003. The lake handbook, Vol. 1: Limnology and limnetic ecology. Blackwell</p> <p>Walker, C.H. et al., 2000. Principles of Ecotoxicology. Taylor & Francis.</p> <p>Đặng Ngọc Thanh, Hồ Thanh Hải, 2007. Cơ sở thủy sinh học. NXB Khoa học Tự nhiên và Công nghệ.</p> <p>Lê Văn Khoa, Nguyễn Xuân Quynh, Nguyễn Quốc Việt, 2007. Chỉ thị sinh học môi trường. NXB Giáo dục Hà Nội.</p> <p>Lamb, J.C., 1985. Water Quality and Its Control. John Wiley. O’Riordan, T. (Ed) 1995.</p> <p>Environmental Science for Environmental Management. Prentice Hall.</p> <p>Chorus, I., Bartram, J., 1999. Toxic cyanobacteria in water: a guide to their health consequences, monitoring and management. E & FN Spon.</p>
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Module Handbook for Strength of Materials

Module designation	<i>Strength of Materials</i>
Semester (s) in which the module is taught	<i>4th</i>
Person responsible for the module	<i>Nguyen Hong An Nguyen Thai Binh Luong Van Hai Cao Van Vui</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory / elective / specialisation</i> <i>Names of other study programmes with which the module is shared</i>
Teaching methods	<i>lecture, lab works</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:</i> <i>Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 30 periods of lecture; 20 periods of laboratory session.</i> <i>Private study including examination preparation, specified in hours¹: 95 hours of Self Study</i>
Credit points	<i>3</i>
Required and recommended prerequisites for joining the module	<i>Non</i>

<p>Module objectives/intended learning outcomes</p>	<p><i>Key question: what learning outcomes should students attain in the module?</i></p> <p><i>L.O.1 - An ability to identify, formulate and solve complex engineering problems by applying principles of mathematics, science and engineering.</i></p> <p><i>L.O.1.1 - Determine calculation diagrams for real structures; modeling external loadings and actions; Determine reaction forces; drawing internal force diagrams for bars and beams</i></p> <p><i>L.O.1.2 - Show the distribution of stress on the cross-section of the bar/beam; evaluation of the strength condition (3 fundamental problems) for bar/beam; calculate the displacement in bar/beam</i></p> <p><i>L.O.2 - An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives</i></p> <p><i>L.O.3 - An ability to design and conduct appropriate experimentation, analyze and interpret data in the field of engineering.</i></p> <p><i>L.O.3.1 - Ability to prepare and conduct tests to determine the mechanical properties of materials; investigate the behavior of bar/beam structures subjected to different types of loadings; be able to present the results report of the experiments</i></p>
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¹ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

<p>Content</p>	<p><i>The description of the contents should clearly indicate focus areas and the level of difficulty.</i></p> <p>CHAPTER 1A. BASIC CONCEPTS:</p> <p><i>The concept of the subject (tasks, objects); Object classification, basic deformation classification; Basic assumptions; External loadings, types of supports and reactions; Equilibrium Equations.</i></p> <p>CHAPTER 1B. INTERNAL FORCE THEORY:</p> <p><i>General concepts; Determining internal force; Internal force of plan problem (conventional internal force sign, internal force diagrams); Relationship of internal force and acting loads for plan problem; Introducing two methods for drawing the internal force diagrams; Internal force and stress relationship.</i></p> <p>CHAPTER 2. AXIAL LOAD SIMPLE TENSION (COMPRESSION):</p> <p><i>Definitions axially loaded member; normal force diagram; normal stress; normal strain; lateral strain; Mechanical Properties of Materials; Stress Strain Relation; allowable stresses and allowable loads; elastic deformations under tension (compression); strength conditions & 3 fundamental problems.</i></p> <p>CHAPTER 3. STRESS STATE & THEORY OF FAILURE CHAPTER 4. PROPERTIES OF CROSSSECTIONAL AREAS:</p> <p><i>First moment of area; coordinates of the centroid; moments of inertia of an area w/r an axis; polar moment of inertia; product of inertia of an area;</i></p>
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	<p><i>principal axes of inertia; central principal axes; radii of gyration; moments of inertia with respect to parallel axes; transformation of area moments of inertia – rotation of axes; moments of inertia of some particular sections.</i></p> <p>CHAPTER 5. PLANE BENDING OF BEAM:</p> <p><i>Introduction; Pure bending of beam (experiment & observations, hypotheses, formulation of normal stress, normal stress diagram, stress strain relation, stress - internal forces relations); Transverse bending (formulation of normal stress, formulation of shear stress, shear stress diagram); Strength conditions, 3 fundamental problems; Deflection of beams: slope and displacement by integration.</i></p> <p>CHAPTER 6. PURE TORSION OF CIRCULAR SHAFTS:</p> <p><i>Introduction; internal torque diagram in statically determinate members; Torsional members of circular cross section: formulation of stress, strength of condition, 3 fundamental problems; Transmission of power by circular shafts; Pure torsion of rectangular cross section members; Stress and strain in closed-coiled helical springs.</i></p> <p>CHAPTER 7. COMBINED LOADINGS</p> <p>CHAPTER 8. EXPERIMENTS:</p> <p><i>1. Tension test (ductile and brittle materials: steel and cast iron); 2. Compression test (ductile and brittle materials: steel and cast iron);</i></p>
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	3. Displacement and rotation of cantilever beam/simple beam; 4. Torsion test.
Exams and assessment formats	Final exam: 90 minutes; constructed response; closed-book exam Assignments Experimental final report: Prerequisite
Study and examination requirements	Requirements for successfully passing the module Final exam – 60%; Group assignments – 20%; Experimental report – 20%.
Reading list	[1] Hibbeler R.C., <i>Mechanics of Materials</i> , Prentice Hall, 2014 [2] Gere J.M., <i>Mechanics of Materials</i> , Thomson Learning, 2001 [3] Benham, Crawford, <i>Mechanics of Engineering Materials</i> , 2nd Edition, Longman, 1996 [4] Lecture notes of Strength of Materials (Update every semester)

Module Handbook for Course on Cleaner Production (EN4019)

Module designation	<i>Cleaner Production (EN4019)</i>
Semester(s) in which the module is taught	<i>1 and 2 (depending on selection and enrolment of students)</i>
Person responsible for the module	<i>Associate Professor Vo Le Phu</i>
Language	<i>Vietnamese and English</i>
Relation to curriculum	<i>Compulsory (specialisation) Environmental Engineering</i>
Teaching methods	<i>Lecture, documentary films, group works/discussion/ presentation.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 36 hours (theory: 15, assignment: 21, homework: 13.5) Contact hours: 3 hrs/week Private study including examination preparation, specified in hours: 25 hrs</i>
Credit points	<i>2</i>
Required and recommended prerequisites for joining the module	<ul style="list-style-type: none"> - <i>Pre-requisite course: N/A</i> - <i>Pre-courses: Environmental Law and Policy (EN2025), Urban and Industrial Environmental Management (EN3037)</i> - <i>Parallel courses: Green Technology (EN4015); ISO & Environmental Auditing (EN3017)</i>

Module objectives/intended learning outcomes	<p><i>Upon the completion of this course, students are able to achieve the following knowledge and skills:</i></p> <ul style="list-style-type: none"> - <i>Knowledge: (i) Understand and explain the significance and important role of cleaner production (CP); (ii) Understand and analyse steps of cleaner production process; (iii) Identify and analyze reasons for generating waste streams.</i> - <i>Skills: (i) Develop skills for analysis and argument of waste flows in industrial process; (ii) Teamwork and multidisciplinary cooperation.</i> - <i>Competences: (i) Analyse and evaluate economic benefits of cleaner production; and (ii) Evaluate the paradigm of resource conservation in industrial production.</i>
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<p>Content</p>	<p><i>The purpose of this course is to provide students with following topics:</i></p> <ul style="list-style-type: none"> - <i>The overview of economic development, control and preventive pollution, history of industrial pollution control, connections between cleaner production and sustainable development.</i> - <i>Basic concepts and terminologies: cleaner production, clean technology, clean-up technology, green technology, waste minimization at source, waste; cleaner production techniques; pros and cons of cleaner production.</i> - <i>Cleaner production process and steps of assessment and methods for getting profits from cleaner production for a cleaner production project.</i> - <i>Approaches to reduce greenhouse gases (GHGs) through Clean Development Mechanism (CDM) and product-redesigning for resource conservation.</i> - <i>Case studies of cleaner production projects in Vietnam and Ho Chi Minh City which were implemented towards resource conservation and pollution minimization.</i>
<p>Exams and assessment formats</p>	<ul style="list-style-type: none"> - <i>One (01) Individual Essay (take-home written assignment): students work in 6 weeks and submit in the 9th week of the course.</i> - <i>One (01) Group Works: each group consists of 4-5 students, choose their own topic from week 2. Group presentation in week 7 for about 30 minutes. Assessment of each group is based on an agreed rubric.</i> - <i>One (01) Mid-term exam (week 7)</i> - <i>One (01) final exam: quizzes-based and calculation.</i>

Study and examination requirements	<ul style="list-style-type: none"> - <i>All materials (lecture handouts, article papers, reports and case studies) are provided on BK-elearning (BKeL).</i> - <i>Students are required to be at least 90% attendance of theoretical lectures and 100% of individual assignments, discussion, presentation of the course.</i> - <i>Students are provided with ideas of individual essay's topics in Week 2 of the course. Individual essays should be submitted in Week 9. Maximum length of the essay is 2,500 words (excluded tables, diagrams, figures).</i> - <i>Group works presentation will be performed in Week 7 – 10. Assessment Rubrics for group presentation will be discussed in Week 1 of the course.</i> - <i>The final grade includes individual Essay (30%); group presentation (20%); final exam (50%).</i> - <i>Students must have a final grade of 50% or higher to pass the course.</i> - <i>Students do not submit individual assignment and do not participate group presentation will not be allowed to participate the final exam.</i>
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<p>Reading list</p>	<p>Textbook and main readings:</p> <p>[1] Kirkwood, R.C. and Longley, A. (Eds.) (1995). <i>Clean Technology and the Environment</i>. Blackie Academic & Professional, London.</p> <p>[2] Rossiter, A.P. (Ed). (1995). <i>Waste Minimization through Process Design</i>. McGraw-Hill Inc, New York.</p> <p>[3] Mitchell, C. (2003). <i>Promoting Cleaner Production in Vietnam: The Role of Training and Education in Strengthening Industry's Environmental Behaviour</i>. Final Master Report, University of Toronto, Canada</p> <p>Additional readings:</p> <p>[4] Mitchell, C. (2006). <i>Beyond Barriers: Examining Root Causes behind Commonly cited Cleaner Production Barriers in Vietnam</i>. <i>Journal of Cleaner Production</i>, 14(18): 1576-1585.</p> <p>[5] UNEP and Ministry of Planning and Investment of Vietnam. (2001). <i>Profiting from Cleaner Production</i>. Project on "Strategies and Mechanism for Promoting Cleaner Production in Developing countries".</p> <p>[6] Van Berkel, R. (1999). <i>Cleaner Production Opportunities for Small to Medium Sized Enterprises</i>. Waste & Recycle Convention, 5-6 August 1999, Perth, Australia.</p>
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Module Handbook for *WATER SUPPLY AND SEWERAGE SYSTEM*

Module designation (Tên môn học)	<i>WATER SUPPLY AND SEWERAGE SYSTEM</i>
Semester(s) in which the module is taught (Học kỳ giảng dạy)	<i>Semester 3</i>
Person responsible for the module	<i>Nguyen Quang Truong Ph.D, Phan Xuan Thanh MSc</i>
Language (ngôn ngữ)	<i>English</i>
Relation to curriculum (Các môn học liên quan)	<i>Compulsory</i>
Teaching methods (Phương pháp giảng dạy)	<i>lecture, lab works, seminar</i>
Workload (incl. contact hours, self-study hours) (Thời lượng làm việc)	<i>(Estimated) Total workload: Total workload:</i> <i>- 39 hr of lecture,</i> <i>- 18 hr of project</i> <i>- 135 hours of self-study</i>
Credit points (số tín chỉ)	<i>3</i>
Required and recommended prerequisites for joining the module (những yêu cầu kiến thức trước khi học)	<i>Basic knowledge on:</i> <i>- Fluid mechanics;</i>
Module objectives/intended learning outcomes (Mục tiêu môn học, yêu cầu CDR)	<i>Providing for students the knowledge and skills of infrastructure projects for urban water supply and sewerage. Students can understand and apply through the management steps from planning, design, construction and installation, management, operation and maintenance the</i>

	<i>water supply network, sewerage network, storm water drainage networks and drainage networks in the building</i>
Content (Nội dung)	<ul style="list-style-type: none"> - <i>Water demand and water supply system</i> - <i>Sewerage system and stormwater system</i>
Exams and assessment formats (Hình thức kiểm tra và thi)	<ul style="list-style-type: none"> - <i>Exercise: homework, exercise during class</i> - <i>Project</i> - <i>Final exam: Writing test</i>
Study and examination requirement (tỉ lệ đánh giá học tập)	<ul style="list-style-type: none"> - <i>Exercise: 20%</i> - <i>Project: 30%</i> - <i>Final exam: 50%</i>
Reading list (Tài liệu)	<p><i>[1]. Neil S. Grigg. Water, wastewater and stormwater infrastructure management. Lewis Publisher, 2003.</i></p> <p><i>[2] Walski T. M. et al. Water distribution modeling. Haestad Press, 2001.</i></p> <p><i>[3] George A. Raftelis. Water and wastewater finance and pricing, Taylor & Francis, 2005.</i></p> <p><i>[4] US EPA. Water Security Initiative: Interim Guidance on Developing an Operational Strategy for Contamination Warning Systems, 2008.</i></p>

Module Handbook for Environmental Hydrology

Module designation (Tên môn học)	<i>Environmental Hydrology</i>
Semester(s) in which the module is taught (Học kỳ giảng dạy)	<i>Semester 5</i>
Person responsible for the module	<i>Assoc./Prof. Dr. Tran Thi Van</i> <i>Please indicate a specific person.</i>
Language (ngôn ngữ)	<i>Vietnamese</i>
Relation to curriculum (Các môn học liên quan)	
Teaching methods (Phương pháp giảng dạy)	<i>Lecture, seminar (invited expert, if any), presentation, video, lab visit (if any).</i>
Workload (incl. contact hours, self-study hours) (Thời lượng làm việc)	<i>Total workload:</i> <i>- 30 hrs of lecture,</i> <i>- 12 hrs of exercises and practices</i> <i>- 27 hrs of self-study</i>
Credit points (số tín chỉ)	<i>3</i>
Required and recommended prerequisites for joining the module (những yêu cầu kiến thức trước khi học)	

Module objectives/intended learning outcomes (Mục tiêu môn học, yêu cầu CĐR)	<p><i>Provide the basic elements to understand the water physics processes, river basin, flow, the interactions between hydrosphere and environment, contaminant transport.</i></p> <p><i>Equip students with computational skills and software practice to apply hydrology in the environment and basin management.</i></p> <p><i>Training will be achieved through lectures, the use of analytical and numerical models, and exercises in the classroom.</i></p>
Content (Nội dung)	<p><i>Students achieve the water physics processes, the water cycle, processes in the hydrologic cycle, river and basin hydrology, flow formation, groundwater, reservoirs and swamps, tides and saline intrusion, pollution and water quality, hydrographic measurement and calculation.</i></p> <p><i>Numerical methods for the solution of flow and transport problems in aquifers.</i></p>
Exams and assessment formats (Hình thức kiểm tra và thi)	<ul style="list-style-type: none"> • <i>Midterm: Term project (30 minutes/presentation)</i> • <i>Final exam: Writting exam (60-120 minutes)</i>
Study and examination requirements (Tỉ lệ đánh giá học tập)	<ul style="list-style-type: none"> • <i>Assignment: 30%</i> • <i>Project: 20%</i> • <i>Final exam: 50%</i>

<p>Reading list (Tài liệu)</p>	<ul style="list-style-type: none"> • Nguyen Thi Bay (2018). Applied hydrology and calculations. Ho Chi Minh City National University Publishing House • Nguyen Khac Cuong (2007). Environmental hydrology. Ho Chi Minh City National University Publishing House • Nguyen Van Tuan (2006). General hydrology. Agriculture Publishing House • Nguyen Van Tuan, Nguyen Huu Khai (2021). Hydrogeography. Hanoi National University Publishing House • Nguyen Thanh Son, Dang Quy Phuong (2003). Measuring and editing hydrological data. Hanoi National University Publishing House • Nguyen Huu Khai (2008). Statistical analysis in hydrology. Hanoi National University Publishing House • Tran Thanh Xuan, Hoang Minh Tuyen, Tran Thuc, Tran Hong Thai, Nguyen Kien Dung (2012). Water resources of the main river systems of Vietnam. Science and Technology Publishing House • Andy D. Ward, Stanley W. Trimble, Suzette R. Burckhard, John G. Lyon (2015). <i>Environmental Hydrology [3 ed.]</i>. CRC Press • Saeid Eslamian (2014). <i>Handbook of Engineering: Hydrology Environmental Hydrology and Water Management</i>. CRC Press • Rajib Maity (2018). <i>Statistical Methods in Hydrology and Hydroclimatology [1st ed.]</i>. Springer Singapore
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	<ul style="list-style-type: none"> • André Musy; Benoit Hingray; Cécile Picouet (2014). <i>Hydrology : A Science for Engineers</i>. CRC Press. Taylor and Francis Publisher • Bedient, Philip B.; Huber, Wayne Charles; Vieux, Baxter E. (2013). <i>Hydrology and Floodplain Analysis</i>. Pearson Publisher.
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Module Handbook for Environmental Management in Urban and Industrial Park

Module designation (Tên môn học)	<i>Environmental Management in Urban and Industrial Park</i> <i>(Quản lý môi trường đô thị và khu công nghiệp) – EN3037</i>
Semester(s) in which the module is taught (Học kỳ giảng dạy)	
Person responsible for the module (Giảng viên)	<i>Lê Văn Khoa</i> <i>Hồ Thị Ngọc Hà</i>
Language (ngôn ngữ)	<i>English / Vietnamese</i>
Relation to curriculum (Các môn học liên quan)	<i>Compulsory / elective / specialisation</i> <i>Names of other study programmes with which the module is shared</i>
Teaching methods (Phương pháp giảng dạy)	<ul style="list-style-type: none"> - <i>Power Point + Video Clip</i> - <i>Discussion (Thảo luận)</i> - <i>Group Work (Làm việc nhóm),</i> - <i>Group Presentation (Trình bày nhóm),</i> - <i>Play a role (Sắm vai)</i> - <i>Case Study (Giải quyết tình huống cụ thể)</i> - <i>Live stream – Online learning (Giảng dạy trực tuyến)</i> - <i>Practical Survey, Observation (Khảo sát thực tế)</i> - <i>Blended Teaching (Phối hợp giảng dạy với GV nước ngoài)</i>

Workload (incl. contact hours, self-study hours) (Thời lượng làm việc)	<i>(Estimated) Total workload: 45</i> <i>Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 03 hours /week</i> <i>Private study including examination preparation, specified in hours⁹: 135 hours</i>
Credit points (số tín chỉ)	03
Required and recommended prerequisites for joining the module (những yêu cầu kiến thức trước khi học)	

⁹ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

<p>Module objectives/intended learning outcomes (Mục tiêu môn học, yêu cầu CDR)</p>	<p><i>Students acquire basic and practical knowledge about environmental management in urban & in industrial production activities; course learning will help students to build some skills, including: problem-solving; experiment and knowledge discovery; systems thinking; critical thinking; and effective teamwork & communication. And, students also know how to apply knowledge to benefit society.</i></p> <p><i>Sinh viên nắm được kiến thức cơ bản và thực tiễn về quản lý môi trường đô thị & quản lý môi trường trong hoạt động sản xuất công nghiệp; trong quá trình học tập môn học giúp sinh viên xây dựng các kỹ năng: Kỹ năng tư duy & giải quyết vấn đề; kỹ năng thực nghiệm và khám phá kiến thức; có tư duy tâm hệ thống; kỹ năng và phẩm chất cá nhân cần thiết (tư duy phản biện); và kỹ năng làm việc theo nhóm & giao tiếp hiệu quả. Sinh viên cũng biết áp dụng kiến thức để đem lại lợi ích cho xã hội.</i></p>
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<p>Content (Nội dung)</p>	<p><i>For meeting the course's objective, its content includes the concepts of current environmental issues, main environmental management instruments in urban and industrial areas. The course focuses to three prominent urban environmental issues as: Air quality management, water resource management and solid waste management. Besides, main approaches in industrially environmental management & practical environmental management issues in industrial parks also are introduced. Integrated with theory, practical experiences of environmental management in urban & industrial areas in Vietnam and around the world are presented and analysed.</i></p> <p><i>Để đáp ứng mục tiêu, nội dung môn học bao gồm các khái niệm về vấn đề môi trường hiện nay, các công cụ quản lý môi trường chính trong đô thị và khu công nghiệp. Môn học tập trung giới thiệu về 03 vấn đề môi trường đô thị nổi bật là quản lý chất lượng không khí, quản lý tài nguyên nước đô thị và quản lý chất thải rắn. Bên cạnh đó, các cách tiếp cận chính trong quản lý môi trường công nghiệp và các vấn đề quản lý môi trường thực tế trong khu công nghiệp cũng được giới thiệu. Lồng ghép với lý thuyết là các kinh nghiệm về QLMTĐT&CN ở Việt Nam và các nước trên thế giới được trình bày và phân tích</i></p>
<p>Exams and assessment formats (Hình thức kiểm tra và thi)</p>	<p><i>Group assignment + Oral Presentation (45' – 60'/assignment),</i></p> <p><i>One final exam (90 minutes),</i></p> <p><i>And home works (individual, group)</i></p> <p><i>Tiểu luận và trình bày nhóm (45-60 phút/tiểu luận)</i></p> <p><i>Thi tự luận cuối khóa (90 phút)</i></p> <p><i>Và bài tập ở nhà (cá nhân, nhóm)</i></p>

<p>Study and examination requirements</p> <p>(Tỉ lệ đánh giá học tập)</p>	<p><i>Evaluation form: Scale of 10; less than 5.5 does not pass;</i> <i>Assignment x 50% + Exam x 50%</i></p> <p><i>- Besides, participating actively in class (AIC), completing homeworks (HW) will be awarded points (not than 20% of exam scores).</i></p> <p>• <i>Conditions for taking the exam:</i></p> <p><i>- Attend more than 2/3 of the total number of lectures;</i></p> <p><i>- Prepare and report group assignment.</i></p> <p><i>Hình thức đánh giá: Thang điểm 10; dưới 5,5 là không đạt;</i> <i>Tiểu luận x50% + Thi x50%</i></p> <p><i>Ngoài ra, tham gia đóng góp tích cực bài giảng trên lớp (AIC), thực hiện đầy đủ các bài tập về nhà (HW) sẽ được tính điểm thưởng (không nhiều hơn 20% điểm thi).</i></p> <p>• <i>Điều kiện dự thi:</i></p> <p><i>- Tham dự trên 2/3 tổng số buổi giảng;</i></p> <p><i>-Thực hiện và báo cáo tiểu luận theo nhóm.</i></p>
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<p>Reading list (Tài liệu tham khảo)</p>	<p>[1] Phạm Ngọc Đăng, 2010. <i>Quản lý môi trường đô thị và khu công nghiệp</i>. Hà Nội: Nhà xuất bản Xây dựng.</p> <p>[2] Jiri Marsalek et al., 2008. <i>Urban Water Cycle Processes and Interactions</i>. UNESCO Publishing.</p> <p>[3] Salah M. El-Haggar, 2007. <i>Sustainable Industrial Design and Waste Management: Cradle-to-cradle for Sustainable Development</i>. Elsevier.</p> <p>[4] UNEP & CalRecovery, Inc, 2005. <i>Solid Waste Management (Volume I)</i>. UNEP.</p> <p>[5] Gregor Haberle (eds.), Hartmut Fritsche et al. 2013. <i>Fachwissen Umwelttechnik</i> – (Bản tiếng Việt: Dương Minh Trí và cs dịch và hiệu đính). Chuyên ngành Kỹ thuật môi trường. Phương Nam Book. 2020.</p> <p>[6] I.V Murali Krishna and Valli Manickam (Auth.), 2017. <i>Environmental Management - Science and Engineering for Industry</i>. Butterworth-Heinemann.</p> <p>[7] Daniel Vallero, 2014. <i>Fundamentals of Air Pollution</i>, Fifth Edition. Elsevier.</p> <p>[8] Susan J. Masten and Mackenzie L. Davis, 2020. <i>Principles of Environmental Engineering and Science</i> (4th edit.). McGraw-Hill Education.</p> <p>[9] Tamim Younos, Tammy E. Parece (eds.), 2016. <i>Sustainable Water Management in Urban Environments</i>. Springer International Publishing.</p>
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Module Handbook for *Environmental Monitoring*

Module designation	<i>Environmental Monitoring</i>
Semester(s) in which the module is taught (Học kỳ giảng dạy)	
Person responsible for the module	<i>Ha Quang Khai, Ph.D.</i>
Language (ngôn ngữ)	<i>English and Vietnamese</i>
Relation to curriculum (Các môn học liên quan)	<i>Environmental Hydrology</i> <i>Environmental chemistry</i>
Teaching methods (Phương pháp giảng dạy)	<i>lecture, exercise, assignment.</i>
Workload (incl. contact hours, self-study hours) (Thời lượng làm việc)	<i>(Estimated) Total workload:</i> <i>Contact hours: lecture + exercise 42 hour</i> <i>Assignment: 9 hour</i>
Credit points (số tín chỉ)	<i>03</i>
Required and recommended prerequisites for joining the module (những yêu cầu kiến thức trước khi học)	<i>No</i>

Module objectives/intended learning outcomes (Mục tiêu môn học, yêu cầu CDR)	<p><i>Student can be able:</i></p> <p><i>to understand basic knowledge on environmental monitoring;</i></p> <p><i>to understand basic related law and regulation in environmental monitoring.</i></p> <p><i>to know technique and methods for environmental monitoring.</i></p> <p><i>To know how to implement a monitoring program.</i></p>
Content (Nội dung)	<p><i>Aim to provide basic knowledge on environmental monitoring including air, soil and water monitoring and discussed monitoring methods and techniques. The course also discuss about law, regulation and how to implement a monitoring project as well as guide student step by step from identify monitoring strategy to reporting results.</i></p>
Exams and assessment formats (Hình thức kiểm tra và thi)	<p><i>e.g. two oral Midterm assessments (20 minutes each) and one final oral exam (40 minutes), short computer-based quizzes, take-home written assignments</i></p>
Study and examination requirements (Tỷ lệ đánh giá học tập)	<p><i>The final grade in the module is composed of 50% performance on exams, 20% exercise, 30% group assignment. Students must have a final grade of 60% or higher to pass</i></p>
Reading list (Tài liệu)	<p>Nguyễn Văn Kiệt, Huỳnh Trung Hải. Quan trắc nước thải công nghiệp. Nxb KH&KT, 2006</p> <p>Janick Artiola, Ian L. Pepper, Mark L. Brusseau. Environmental Monitoring and Characterization, Elsevier Science & Technology Books, 2004</p>

Module Handbook for *ENVIRONMENTAL SYSTEMS ANALYSIS*

Module designation (Tên môn học)	<i>ENVIRONMENTAL SYSTEMS ANALYSIS</i>
Semester(s) in which the module is taught (Học kỳ giảng dạy)	<i>HK 211</i>
Person responsible for the module	<i>Dr. Nguyen Hoang Anh</i>
Language (ngôn ngữ)	<i>Vietnamese, English</i>
Relation to curriculum (Các môn học liên quan)	<i>Environmental Engineering</i>
Teaching methods (Phương pháp giảng dạy)	<i>Lectures: theories and methods, projects, seminars</i>
Workload (incl. contact hours, self-study hours) (Thời lượng làm việc)	<p><i>(Estimated) Total workload:</i></p> <p><i>Contact hours (lectures: 1350 hours, exercises and seminars : 675 hours)</i></p> <p><i>Private study including examination preparation, specified in hours¹⁰: 50 hours</i></p>
Credit points (số tín chỉ)	<i>3</i>
Required and recommended prerequisites for joining the module (những yêu cầu kiến thức trước khi học)	<ul style="list-style-type: none"> <i>- Algebra, statistics</i> <i>- Existing competencies in understanding environmental problems</i>

¹⁰ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

<p>Module objectives/intended learning outcomes (Mục tiêu môn học, yêu cầu CDR)</p>	<p><i>Aims of this course:</i></p> <p><i>The purpose of this course is to train students on concrete and rigorous problem-solving tools that provide a mathematical basis for decision-making. By the end of the course, students will be able to define systems and their boundaries, optimize systems for a set of constraints and objectives, determine the sensitivity of decisions and optimal solutions based on changes in constraints, translate complex problems into networks, and define appropriate sets of solutions when there are multiple, competing objectives. Example problems span natural resource management, traditional environmental engineering processes, and issues in green design and environmental policy.</i></p> <p><i>Course Learning Outcomes</i></p> <ul style="list-style-type: none"> - <i>Skills of thinking and problem solving</i> - <i>Knowledge gain by practice and discovery</i> - <i>Skill of system thinking</i> - <i>Personal skills and characteristics</i> - <i>Professional skills and characteristics</i> - <i>Performing ideas on technical and management systems</i> - <i>Building project/program/policy</i> - <i>Applying project/program/policy to practice</i>
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<p>Content (Nội dung)</p>	<p><i>Introduction of the course</i></p> <ul style="list-style-type: none"> - <i>Information about instructor</i> - <i>Information about course</i> - <i>Ways of teaching & learning</i> - <i>Introduction of references</i> <p><i>Introduction to Systems Theory</i></p> <p><i>Types of systems</i></p> <ul style="list-style-type: none"> • <i>Isolated</i> • <i>Closed</i> • <i>Open</i> <p><i>Properties of systems</i></p> <ul style="list-style-type: none"> • <i>Feedback</i> • <i>Complexity</i> • <i>Self-organization</i> • <i>Self-regulation</i> • <i>Emergence</i> • <i>System hierarchy</i> <p><i>Complex system behavior</i></p> <ul style="list-style-type: none"> • <i>Exponential growth</i> • <i>Logistic growth</i> • <i>Overshoot and oscillation</i> • <i>Overshoot and collapse</i> <p><i>System Analysis</i></p> <ul style="list-style-type: none"> • <i>Methodology</i> • <i>System thinking</i> • <i>Techniques for system analysis</i>
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Methods for System Analysis

Statistical analysis

Introduction to environmental statistics

Statistics fundamental: Data types, Random variation and distribution, Sampling

Sample moments

Exploratory data analysis (EDA)

Statistical Hypothesis Testing: T-test, one/multi-way ANOVA

Get familiar with Jamovi - a user-friendly statistical software

Methods for System Analysis (cont.)

- *Techniques of Graphical Analysis of the environmental systems*
- *Construct model from the analysis of a system: Compartment model*

Qualitative Analysis

- *Multi-criteria Analysis*
- *The weighting methods*
- *Matrix Method for generating scores and weights*
- *Simple Additive Weighting Method (SAW)*
- *Simple Multi-Attribute Rating Technique (SMART)*
- *Cause and effect analysis*
- *Group-based weighting decisions - Delphi method.*

Decision Analysis

- *Multi-criteria Decision Analysis (MCDA)*
- *The concept of decision-support analysis*

	<ul style="list-style-type: none"> - <i>Solutions Using Alternate Objectives</i> - <i>Defining non-inferior sets (Pareto optimality)</i> <p><i>Decision Analysis (cont.)</i></p> <ul style="list-style-type: none"> - <i>Pareto optimality and tradeoff analysis</i> - <i>Trade-off Evaluation (Environmental, Economic, Social Criteria)</i> - <i>Cost-Benefit Analysis</i> - <i>Utility Scoring</i> - <i>Analytical Hierarchy Process (AHP)</i> <p><i>Quantitative Analysis</i></p> <ul style="list-style-type: none"> - <i>Establishing Objectives, Decision Variables, and Constraints</i> - <i>Exploring Different Types and Scales of Systems</i> - <i>Graphing Decision Space and Objective Functions</i> <p><i>Quantitative Analysis (cont.)</i></p> <ul style="list-style-type: none"> - <i>Tragedy of the Commons as an Optimization Problem</i> - <i>Problems with Many Decision Variables</i> - <i>Network Analysis and Dynamic Modelling – Solving Multi-Stage/MultiDecision Environmental Problems</i> <p><i>Environmental Systems Analysis Tools</i></p> <ul style="list-style-type: none"> - <i>Selecting questions and tools</i> - <i>Why these tools?</i> - <i>Key to the questions</i> - <i>Environmental Impact Assessment (EIA)</i> - <i>Strategic Environmental Assessment (SEA)</i>
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	<ul style="list-style-type: none"> - <i>Life Cycle Assessment (LCA)</i> - <i>Environmental Risk Assessment (ERA)</i>
Exams and assessment formats (Hình thức kiểm tra và thi)	<ul style="list-style-type: none"> - <i>Exercises in class</i> - <i>Project and seminars</i> - <i>Final examination (written)</i>
Study and examination requirements (Tỷ lệ đánh giá học tập)	<ul style="list-style-type: none"> • <i>Forms of evaluation: Scale of mark: 10; under mark 5.5 is not met; presentation and submit group assignment.</i> - <i>Exercise: 20%</i> - <i>Project and seminars: 30%</i> - <i>Final examination: 50%</i>
Reading list (Tài liệu)	<ul style="list-style-type: none"> • <i>Meadows (2008) Thinking in Systems, System lens & The basics</i> • <i>Matthews et al. (2015) Life Cycle Assessment</i> • <i>Practical Optimization: A Gentle Introduction</i>

Module Handbook – Environmental Toxicology and Lab Works

Module designation (Tên môn học)	Environmental Toxicology and Lab Works
Semester(s) in which the module is taught (Học kỳ giảng dạy)	<i>4th semester</i>
Person responsible for the module	<i>Dr. Lam Van Giang</i>
Language (ngôn ngữ)	<i>English; Vietnamese</i>
Relation to curriculum (Các môn học liên quan)	<i>Chemistry for Environmental Engineering and science</i>
Teaching methods (Phương pháp giảng dạy)	<i>lecture, lesson, lab works, project, seminar etc.</i>
Workload (incl. contact hours, self-study hours) (Thời lượng làm việc)	<p><i>(Estimated) Total workload:</i></p> <p><i>Contact hours (please specify whether lecture, exercise, laboratory session, etc.):</i></p> <p><i>Private study including examination preparation, specified in hours¹¹:</i></p>
Credit points (số tín chỉ)	3
Required and recommended prerequisites for joining the module (những yêu cầu kiến thức trước khi học)	<i>Chemistry for Environmental Engineering and science</i>

¹¹ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

<p>Module objectives/intended learning outcomes (Mục tiêu môn học, yêu cầu CĐR)</p>	<ul style="list-style-type: none"> - <i>Knowledge:</i> Recognise current environmental ecotoxicology problems and comprehend ecotoxicology characteristics - <i>Skills:</i> Skills of thinking and problem solving ; Experimental skills and knowledge discovery; Skill of system thinking; Personal skills and characteristics;; Skills of group working and effective communication - <i>Competences:</i> Apply knowledge to benefit society
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<p>Content (Nội dung)</p>	<p>Students will be supplied knowledge about toxicology agents in environment, their sources and biogeochemistry cycles, the ways they threat the eco-system and human beings. This subject also supplies the knowledge about methods of prevention and cures.</p> <p>Undergraduate students are introduced about the principles, clarifications and definitions of environmental toxicology. The subject also introduces chemical and physical agents in earth, water and air as well as the behaviors and poisoning ways of those agents in component environments and their biogeochemistry cycles.</p> <p>The subject particularly focuses on the detrimental effects of toxic elements and substances on living organisms, especially on populations and communities within defined ecosystems.</p> <p>Moreover, undergraduate students are also introduced about the accumulation processes of chemical and physical agents in the environment, the transfer pathways of those agents and their interactions with the environment, the response of living organisms on those agents.</p>
<p>Exams and assessment formats (Hình thức kiểm tra và thi)</p>	<ul style="list-style-type: none"> - <i>Midterm assessments (45 minutes each)</i> - <i>and one final exam (70 minutes),</i> - <i>short computer-based quizzes,</i> - <i>take-home written assignments</i> - <i>Labworks</i>

Study and examination requirements (Tỉ lệ đánh giá học tập)	<p><i>Requirements for successfully passing the module</i></p> <ul style="list-style-type: none"> - <i>the final grade in the module is composed of 70% performance on exams, 5% quizzes, 5% take-home assignments, 5% in-class participation and Labworks report 15%. Students must have a final grade of 50% or higher to pass</i>
Reading list (Tài liệu)	<p>[1] Peter Calow. Handbook of Ecotoxicology. Blakwell sciences. Inc Cambridge, 1993</p> <p>[2] Ruchirawat, M. Environmental toxicology. Vol. I, UNDP, Bangkok, 1997</p> <p>[3] Ruchirawat, M. Environmental toxicology. Vol. II, UNDP, Bangkok, 1997</p>

Module Handbook – Green Technology

A Module Handbook or collection of module descriptions that is also available for students to consult should contain the following information about the individual modules:

Module designation (Tên môn học)	<i>Green Technology</i>
Semester(s) in which the module is taught (Học kỳ giảng dạy)	<i>6th semester</i>
Person responsible for the module	<i>Dr. Lam Van Giang, Ms. Du My Le</i>
Language (ngôn ngữ)	<i>English; Vietnamese</i>
Relation to curriculum (Các môn học liên quan)	<i>Chemistry for Environmental Engineering and science</i>
Teaching methods (Phương pháp giảng dạy)	<i>e.g. lecture, lesson, lab works, project, seminar etc.</i>
Workload (incl. contact hours, self-study hours) (Thời lượng làm việc)	<i>(Estimated) Total workload: Contact hours (please specify whether lecture, exercise, laboratory session, etc.): Private study including examination preparation, specified in hours¹²:</i>
Credit points (số tín chỉ)	<i>3</i>

¹² When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Required and recommended prerequisites for joining the module (những yêu cầu kiến thức trước khi học)	<i>Chemistry for Environmental Engineering and science</i>
Module objectives/intended learning outcomes (Mục tiêu môn học, yêu cầu CDR)	<ul style="list-style-type: none"> - <i>Knowledge: Comprehend basic knowledge, current applications and developments of green technology</i> - <i>Skills: Skills of thinking and problem solving Experimental skills and knowledge discovery; Skill of system thinking; Personal skills and characteristics;; Skills of group working and effective communication</i> - <i>Competences: Apply knowledge to benefit society</i>

<p>Content (Nội dung)</p>	<p>Students will be supplied knowledge about professional technology applications in term of Green and eco-friendly. Green technology was involved the design, assesment, application, management tools on the fields of Industrial Ecology, Chemical, Energy, Construction.</p> <p>Undergraduate students are introduced about the principles, clarifications and definitions of Green on Industrial ecology, Chemical, Energy, Construction.</p> <p>The industrial ecology was analyzied with the principle of prevent pollutions, zero emission in the material recycle ways. The subject also introduces to analyze the production process, material-cycle, energy efficiency and to quantify the impact factors. The typical modem was introduced in each parts.</p> <p>Green technology is introduced also on Chemitry and Energy research and applications in term of intergated analyses technology, economy, policy to forward low carbon development.</p> <p>Green construction also was analized with the multi solutions and intergrated the principles of artchitecture and environment designs</p>
<p>Exams and assessment formats (Hình thức kiểm tra và thi)</p>	<ul style="list-style-type: none"> - <i>Midterm assessments (45 minutes each)</i> - <i>and one final exam (70 minutes),</i> - <i>short computer-based quizzes,</i> - <i>take-home written assignments</i> - <i>Labworks</i>

Study and examination requirements (Tỷ lệ đánh giá học tập)	<p><i>Requirements for successfully passing the module</i></p> <ul style="list-style-type: none"> - <i>The final grade in the module is composed of 70% performance on exams, 5% quizzes, 5% take-home assignments, 5% in-class participation and Labworks report 15%. Students must have a final grade of 50% or higher to pass</i>
Reading list (Tài liệu)	<p>[1] Robert U. Ayres and Leslie W. Ayres, (2002). A Handbook of Industrial Ecology. Edward Elgar Publishing, Inc, Cheltenham, UK • Northampton MA, USA.</p> <p>[2] James C. and Duncan M. (2002) Handbook of Green chemistry and Technology. Blackwell Publishing.</p> <p>[3] Allen, D.T and Shonnard D.R. (2002). Green Engineering: Environmentally conscious design of chemical processes, Prentice Hall, Inc, USA.</p> <p>[4] Sanjay K. S., Ackmez M. (2010). Green chemistry for Environmental sustainability, CRC Press 2011 by Taylor and Francis Group, LLC.</p> <p>[5] Aswathanarayana U., T. Harikrishnan, Thayyib Sahini K.M. (2010). Green energy : Technology, Economics, and Policy. CRC Press. Taylor & Francis Group, London, UK.</p> <p>[6] Ibrahim D., Adnan M., Arif H., T. Hikmet K. T. (2010) Global Warming: Engineering Solutions. Springer Science-Business Media. e-ISBN 978-1-4419-1017-2.</p> <p>[7] Michael B., Peter M. and Michael S. (2010) Green building – Guidebook for Sustainable Architecture, Springer-Verlag Berlin Heidelberg.</p>

Module Handbook for Thermodynamics and Heat Transfer

Module designation	<i>Thermodynamics and heat transfer</i>
Semester(s) in which the module is taught	4
Person responsible for the module	<ol style="list-style-type: none"> 1. Dr. Ha Anh Tung, Department of Heat and Refrigeration Engineering, Faculty of Mechanical Engineering. 2. Dr. Phan Thanh Nhan, Department of Heat and Refrigeration Engineering, Faculty of Mechanical Engineering.
Language	<i>English</i>
Relation to curriculum	<ul style="list-style-type: none"> - <i>Compulsory, specialisation</i> - <i>Names of other study programmes with which the module is shared: Mechanical engineering, Transportation engineering, Applied science, Environment and Natural Resources.</i>
Teaching methods	<i>Lecture, lesson, lab works, project.</i>
Workload (incl. contact hours, self-study hours)	<p><i>Total workload: 154 hours</i></p> <p><i>Contact hours:</i></p> <ul style="list-style-type: none"> - <i>Lecture and exercise on class: 36 hours</i> - <i>Laboratory: 9 hours</i> - <i>Project: 14 hours</i> <p><i>Private study including examination preparation in hours¹: 95 hours</i></p>
Credit points	3
Required and recommended prerequisites for joining the module	<i>Physics 1</i>

Module objectives/intended learning outcomes	<p><i>The aim of this course is to provide students with knowledge and skills required to apply the basic principles of thermodynamics and heat transfer to perform calculations and explain thermal engineering applications, including thermal power plants, refrigeration and air conditioning systems, drying equipment, heat exchangers, etc.</i></p> <p><i>Learning outcomes: When students finish this course, they will be able to:</i></p> <ol style="list-style-type: none"> <i>1. Understand the first law and the second law of thermodynamics;</i> <i>2. Solve problems related to ideal gases, pure substances and atmospheric air.</i> <i>3. Solve problems related to three heat transfer mechanisms: Conduction, Convection and Radiation;</i> <i>4. Solve problems related to Heat exchangers using the Log Mean Temperature Difference Method and the Effectiveness–NTU Method;</i> <i>5. Measure thermal parameters (temperature, pressure, velocity, etc.) and evaluate the performance of thermal cycles using experiments;</i> <i>6. Understand more terminology terms (in English) of thermodynamics and heat transfer, improve teamwork and communication skills through in-class activities.</i>
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¹ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

<p>Content</p>	<p><i>“Thermodynamics and heat transfer” is an essential part of engineering curricula, and has a broad application area such as transportation vehicles, power generation and cooling systems. During the course the students will develop their skills and knowledge in the following areas:</i></p> <ul style="list-style-type: none"> <i>+ Basic concepts: thermodynamic systems, property, state, process, heat and work, etc.;</i> <i>+ The first and second laws of thermodynamics;</i> <i>+ Ideal gas and related applications: Compressors and Internal engines;</i> <i>+ Pure substances and related applications: Vapor power cycles, Refrigeration and heat pump cycles;</i> <i>+ Moist air and related applications: Heating and cooling, Humidification and Dehumidification, Adiabatic mixing of airstreams, Drying processes.</i> <i>+ Introduction to heat transfer mechanisms: Conduction, Convection and Radiation;</i> <i>+ Steady and Transient heat conduction;</i> <i>+ Natural and forced convection;</i> <i>+ Radiation heat transfer;</i> <i>+ Heat exchangers.</i>
<p>Exams and assessment formats</p>	<ul style="list-style-type: none"> <i>- Midterm assessments (20 minutes each) and one final oral exam (40 minutes), short computer-based quizzes, take-home written assignments</i>

Study and examination requirements	<p><i>Students must have a final grade of 60% or higher to pass.</i></p> <p><i>The final grade includes:</i></p> <ul style="list-style-type: none"> <i>+ 10%: Exercises</i> <i>+ 15%: Laboratory evaluation</i> <i>+ 15%: Quiz</i> <i>+ 20%: Mid-term exam</i> <i>+ 40%: Final exam</i>
Reading list	<p><i>[1] Hoàng Đình Tín, Lê Chí Hiệp, Nhiệt động lực học kỹ thuật, NXB Đại học Quốc gia Tp.HCM, 2021.</i></p> <p><i>[2] Hoàng Đình Tín, Cơ sở truyền nhiệt và thiết kế thiết bị trao đổi nhiệt, NXB Đại học Quốc gia Tp.HCM, 2013.</i></p> <p><i>[3] Hoàng Đình Tín, Bùi Hải, Bài tập Nhiệt động lực học kỹ thuật & truyền nhiệt, NXB Đại học Quốc gia Tp. HCM, 2018.</i></p> <p><i>[4] Michael J. Moran, Howard N. Shapiro, Fundamentals of Engineering Thermodynamics, 9th Edition, John Wiley & Sons, New York, 2018.</i></p> <p><i>[5] Yunus A. Cengel, Michael A. Boles, Thermodynamics: An engineering approach, 9th Edition, McGraw-Hill, Inc., 2019.</i></p> <p><i>[6] Frank Kreith, Raj M. Manglik, Mark S. Bohn, Principles of heat transfer, 8nd Edition, Course Technology, 2017.</i></p>

Module Handbook for Microalgae: Benefit and risk to environment (EN3049)

Module designation (Tên môn học)	Microalgae: Benefit and risk to environment (EN3049)
Semester(s) in which the module is taught (Học kỳ giảng dạy)	173, 201, 202, 211
Person responsible for the module	<i>Đào Thanh Sơn</i>
Language (ngôn ngữ)	<i>Vietnamese and English</i>
Relation to curriculum (Các môn học liên quan)	<i>Compulsory / elective / specialisation</i> <i>Ecology (EN1005)</i> <i>Names of other study programmes with which the module is shared</i>
Teaching methods (Phương pháp giảng dạy)	<i>Lecture, seminar, exercise, group discussion, video clip illustration, etc.</i>

Workload (incl. contact hours, self-study hours) (Thời lượng làm việc)	<p><i>(Estimated) Total workload: 91,3 units (1 unit ~ 60 min)</i></p> <p><i>Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 27 units for lecture (theory), 9 units for seminar during class</i></p> <p><i>Private study including examination preparation, specified in hours¹³: 30 hours (2 hours per week x 15 weeks in a semester) for individual question & discussion in the office, 12 hours (1.5 working days) for exercise preparation for the whole semester, 32 hours (3 working days) for mid –term test and seminar assessment/ grading, 16 hours (2 working days) for final exam assessment/ grading, further 15 working days for material/ reference reading for updating the syllabus and lecture contents, 30 working days for experiment/ study for self enhancement on the teaching qualification (experiences and skills)</i></p>
Credit points (số tín chỉ)	2
Required and recommended prerequisites for joining the module (những yêu cầu kiến thức trước khi học)	N/A

¹³ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

<p>Module objectives/intended learning outcomes (Mục tiêu môn học, yêu cầu CDR)</p>	<p><i>Key question: what learning outcomes should students attain in the module</i></p> <p><i>After completing the course, students could (learning outcomes)</i></p> <ul style="list-style-type: none"> - <i>Know the basic knowledge on microalgal groups in aquatic environment and their distribution in nature</i> - <i>Understand the relationship between the microalgal development and environmental in water bodies</i> - <i>Be able to analyze and evaluate the potential benefit and risk of microalgae to aquatic environment and ecosystems</i> - <i>Be able to practice / answer a question based on microalgae data</i> - <i>Be able to present/ discuss/ group working</i>
<p>Content (Nội dung)</p>	<p><i>The description of the contents should clearly indicate focus areas and the level of difficulty.</i></p> <p>Introduction to the course</p> <p>Chapter 1: Introduction on microalgae</p> <p>Chapter 2: Development of microalgae and function of environmental parameters</p> <p>Chapter 3: Benefits from microalgae</p> <p>Chapter 4: Negative effects of microalgae</p> <p>Chapter 5: Approaches for prevention, mitigation and control the blooms of microalgae algae, and treatments on algal toxins</p> <p>Group presentation / report</p>

Exams and assessment formats (Hình thức kiểm tra và thi)	Assignment, seminar (25 min of presentation; 15 – 20 min for question/ answer): 30% mid-term test (multiple choice, 50 min): 20% final examination (essay, 50 min): 50%
Study and examination requirements (Tỉ lệ đánh giá học tập)	<i>Requirements for successfully passing the module</i> <i>Students must have a final grade of 50% or higher to pass; the final exam must be graded of not less than 3/10.</i>

<p>Reading list (Tài liệu)</p>	<p><i>Main material</i></p> <p>Bellinger, E.G., Sigeo, D.C., 2015. Freshwater Algae - Identification and Use as Bioindicators. Wiley-Blackwell</p> <p>Singh, B., Bauddh, K., Bux, F., 2015. Algae and environmental sustainability. Springer. 194 pp</p> <p><i>Further readings</i></p> <p>Luisa Gouveia, 2011. Microalgae as a feedstock for biofuels. Springer</p> <p>Chorus, I., Bartram, J., 1999. Toxic cyanobacteria in water: a guide to their health consequences, monitoring and management. E & FN Spon</p> <p>Graneli, E., Turner, J.T., 2006. Ecology of harmful algae. Springer</p> <p>Seckbach, J., 2007. Algae and cyanobacteria in extreme environment. Springer</p> <p>Ayhan Demirbas and M. Fatih Demirbas, 2010. Algae Energy - Algae as a new source of biodiesel. Springer</p> <p>Nguyễn Văn Tuyên, 2003. Đa dạng sinh học tảo trong thủy vực nội địa Việt Nam - triển vọng và thử thách. NXB Nông Nghiệp Tp Hồ Chí Minh</p> <p>Sournia, A., 1978. Phytoplankton manual. UNESCO, UK</p> <p>Graham, L.E., Wilcox, L.W., 2000. Algae. Prentice-Hall, US</p> <p>Avigad Vonshak, 2002. <i>Spirulina platensis</i> - Physiology, cell-biology and biotechnology. Taylor and Francis</p>
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Module Handbook for GIS & REMOTE SENSING FOR NATURAL RESOURCES AND ENVIRONMENTAL MANAGEMENT

Module designation (Tên môn học)	<i>GIS & REMOTE SENSING FOR NATURAL RESOURCES AND ENVIRONMENTAL MANAGEMENT</i>
Semester(s) in which the module is taught (Học kỳ giảng dạy)	<i>6</i>
Person responsible for the module	<i>Ms. LUU DINH HIEP, A/Prof. Le Van Trung</i>
Language (ngôn ngữ)	<i>VIETNAMESE</i>
Relation to curriculum (Các môn học liên quan)	<i>Compulsory</i>
Teaching methods (Phương pháp giảng dạy)	<i>Lecture, lesson, lab works, project, seminar</i>
Workload (incl. contact hours, self-study hours) (Thời lượng làm việc)	<i>Total workload: 60 hours (30 hours for lecture, 30 hours for laboratory session)</i>
Credit points (số tín chỉ)	<i>3</i>
Required and recommended prerequisites for joining the module (những yêu cầu kiến thức trước khi học)	<i>Computer skill</i> <i>Existing competences in Environmental Management</i>

<p>Module objectives/intended learning outcomes (Mục tiêu môn học, yêu cầu CĐR)</p>	<p><i>Comprehend basic knowledge and practices about GIS, remote sensing in natural resources and environmental management.</i></p> <p><i>Be able to monitor, judge and resume environmental problems by Geographic Information Systems</i></p> <p><i>Be able to estimate and analyse qualitatively environmental problems by Geographic Information Systems</i></p> <p><i>Perform field surveys and know how to refer document and digital information (GIS data) for comprehending environmental problems which need to be solved</i></p> <p><i>Update information in the field of GIS, remote sensing for natural resources and environmental management</i></p> <p><i>Modeling of natural resources environmental information system and insuring goals can be achieved</i></p>
<p>Content (Nội dung)</p>	<p><i>Students will be supplied the basic knowledge about GIS, remote sensing (RS) and skills to apply GIS, RS in collecting, processing spatial data for natural resources and environmental management. In addition, students will be provided skills to practice on ArcGIS, ENVI software.</i></p> <p><i>Course provides basic knowledge of Geographic Information System (GIS), Remote Sensing (RS) and models of a Geographic Information System, history of GIS establishment and development. The course helps students to represent spatial objects in GIS and using GIS, RS data to analysis, report, making decision. Specialty, course going into the analysis capabilities of GIS and remote sensing applications in natural resource management and environment through the exploitation of</i></p>

	<i>object information has been designed and installed in the database alongwith the ability to integration of GIS.</i>
Exams and assessment formats (Hình thức kiểm tra và thi)	<i>Midterm assessments in the form of seminars, projects and one final written exam (90 minutes), computer-based assignments</i>
Study and examination requirements (Tỉ lệ đánh giá học tập)	<i>The final grade in the module is composed of 50% performance on final exams, 10% quizzes, 10% in-class participation, 30% assignments on computer lab. Students must have a final grade of 50% or higher to pass</i>
Reading list (Tài liệu)	<p><i>[1] Trần Vĩnh Phước, 2001. GIS Một số vấn đề chọn lọc, Nhà xuất bản Giáo dục.</i></p> <p><i>[2] Lê Văn Trung, 2005. Viễn Thám, NXB Đại học Đại học Quốc gia TP.HCM.</i></p> <p><i>[3] Paul A. Longley, Michael F. Goodchild, David J. Maguire, David W. Rhind, 2004. Geographic Information Systems and Science, Wiley.</i></p> <p><i>[4] Keith C. Clarke, 1999. Getting Started with Geographic Information Systems, Prentice Hall.</i></p>

3.2 Elective Subjects - Group C - Management Group

Module Handbook for Economic

Module designation	Economic
Semester(s) in which the module is taught	2
Person responsible for the module	Lai Huy Hung, Tran Duy Thanh, Pham Tien Minh
Language	English and Vietnamese
Relation to curriculum	Elective
Teaching methods	lecture, game, group project
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: Contact hours (please specify whether lecture, exercise, laboratory session, etc.): Private study including examination preparation, specified in hours ¹ :
Credit points	3
Required and recommended prerequisites for joining the module	NONE
Module objectives/intended learning outcomes	After completing the course, learners are able to <ul style="list-style-type: none"> - Explain the basic economic concepts - Explain supply, demand and market interaction - Explain and analyse firm behaviors in different market structures

	<ul style="list-style-type: none"> - Describe and discuss macroeconomic topics such as national income accounts, inflation and unemployment and related problems - Explain the financial system, money system, banking system and the role of central bank. - Discuss and appreciate macroeconomic policies
Content	<p>This course is designed to provide a basic understanding of the economic system. Fundamental economic concepts will be explored and contemporary economic problems and issues will be examined in light of the concepts learned. The course will cover supply, demand and market equilibrium, theory of the firm, competitive market equilibrium, and non-competitive market structures, national income accounting, inflation and unemployment, fiscal policy, the financial system and monetary policy.</p>
Exams and assessment formats	Assignment 15%, Midterm 35%, Project 15%, Final exam 35%.
Study and examination requirements	Requirements for successfully passing the module. Students must have a final grade of 50% or higher to pass.
Reading list	<p>[1] Mankiw, N. G. (2017). Principles of economics. Cengage Learning.</p> <p>[2] Karl, E., Case, F., Oster, R., & Sharon, E. (2017). Principles of Economics. Pearson.</p>

¹ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Module Handbook for Entrepreneurship and Innovation

Module designation	<i>Entrepreneurship and Innovation</i>
Semester(s) in which the module is taught	
Person responsible for the module	<i>Truong Minh Churong</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory (School of Industrial Management, All Faculties of Engineering of the University)</i>
Teaching methods	<i>Lecture, project, seminar.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 110.17</i> <i>Contact hours (for lecture, exercises.): 47</i> <i>Private study including examination preparation, specified in hours¹: 91</i>
Credit points	<i>3</i>
Required and recommended prerequisites for joining the module	<i>NA</i>
Module objectives/intended learning outcomes	<i>L.O.1- Describe the entrepreneur, entrepreneurship process and roles of entrepreneurship in economy development</i> <i>L.O.2- Demonstrate the capability in entrepreneurship process performance</i> <i>L.O.3- Produce a business plan</i> <i>L.O.4- Express careful preparation in decision making to become an entrepreneur</i>

Content	<p><i>Introduction to the course</i></p> <p><i>Entrepreneurial opportunity identification</i></p> <p><i>Entrepreneurial idea Feasibility analysis of entrepreneurial opportunity</i></p> <p><i>Industrial analysis</i></p> <p><i>Business model concepts – Business model classification and their contents</i></p> <p><i>Startup business plan Preparation for startup Team venture and pitching</i></p> <p><i>Management of startup business</i></p>
Exams and assessment formats	<p><i>In-class Exercises : 10%</i></p> <p><i>Group Assignment : 30% Final exam : 60%</i></p>
Study and examination requirements	<p><i>Weighted sum of the in-class exercises, group assignment and final exam must be larger than 5.5 (max. 10)</i></p>
Reading list	<p><i>[1] Barringer, Ireland (2019), Entrepreneurship: Successfully launching new ventures 6th Ed., Pearson Education</i></p> <p><i>[2] Scarborough, N. M. and Cornwall, J. R. (2016). Essentials of Entrepreneurship and Small Business Management. 8th Ed. Pearson Education.</i></p> <p><i>[3] Aulet, B. (2013). Disciplined Entrepreneurship: 24 Steps to a Successful Startup. John Wiley & Sons.</i></p> <p><i>[4] Pijl, P., Lokitz, J., and Solomon, L. K. (2016). Design a Better Business. John Wiley & S</i></p>

¹ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Module Handbook for PRODUCTION AND OPERATIONS MANAGEMENT FOR ENGINEERS

Module designation	<i>PRODUCTION AND OPERATIONS MANAGEMENT FOR ENGINEERS</i>
Semester(s) in which the module is taught	<i>2-3-4</i>
Person responsible for the module	<i>Huynh Thi Phuong Lan Le Phuoc Luong Duong Vo Hung Nguyen Thi Thu Hang</i>
Language	<i>Vietnamese, English</i>
Relation to curriculum	<i>Elective</i>
Teaching methods	<i>Lecture, Lesson, Project, Blended-learning and teaching</i>
Workload (incl. contact hours, self-study hours)	<p><i>(Estimated) Total workload: 125.16</i></p> <p><i>Contact hours (please specify whether lecture, exercise, laboratory session, etc.):</i></p> <p style="padding-left: 40px;"><i>Lecture: 30</i></p> <p style="padding-left: 40px;"><i>Exercise: 12</i></p> <p style="padding-left: 40px;"><i>Assignment: 27</i></p> <p><i>Private study including examination preparation, specified in hours¹: 93</i></p>
Credit points	<i>ECTS: 6</i>
Required and recommended prerequisites for joining the module	<i>None</i>

Module objectives/intended learning outcomes	<p>1. Demonstrate the concepts, operations strategy and decisions.</p> <p>2. Apply various techniques in production planning and control.</p> <p>3. Demonstrate oral and writing skills.</p>
Content	<i>The course provides students the fundamental knowledge and skills of production planning and operations management in industrial organizations so that they have competence in operating a production system efficiently.</i>
Exams and assessment formats	<p><i>In-class short quizzes: 5 quizzes Written Midterm Exam: 50 minutes Written Final Exam: 80 minutes</i></p> <p><i>Group Assignment (written & Presentation)</i></p>
Study and examination requirements	<i>The final grade in the module is composed of 30% performance on midterm exam, 40% final exam, 10% quizzes, 20% group project. To pass the module, students must have a final grade of 50% or higher.</i>
Reading list	<p>[1] Nguyễn Như Phong (2016). Quản lý sản xuất (Tái bản lần thứ nhất). Nhà xuất bản đại học Quốc Gia TP. Hồ Chí Minh.</p> <p>[2] Heizer, J., Render, B. & Munson, C. (2020). Operations Management: Sustainability and Supply Chain Management (13th ed.). Pearson Education, Inc.</p> <p>[3] Russell, R. S. & Taylor, B. W. (2011). Operations Management (7th ed.). Prentice-Hall</p> <p>[4] Russell, R. S. & Taylor, B. W. (2017). Operations and supply chain management (9th ed.). John Wiley & Sons</p> <p>[5] Ulrich, K. & Eppinger, S. (2012). Product Design and Development (5th ed.). McGraw Hill/ Irwin</p>

¹ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted

Module Handbook for PROJECT MANAGEMENT FOR ENGINEERS

Module designation	<i>PROJECT MANAGEMENT FOR ENGINEERS</i>						
Semester(s) in which the module is taught	<i>3-4-5</i>						
Person responsible for the module	<i>Nguyen Thuy Trang, Huynh Thi Phuong Lan, Nguyen Thi Duc Nguyen, Le Phuoc Luong</i>						
Language	<i>Vietnamese, English</i>						
Relation to curriculum	<i>Elective</i> <i>Names of other study programmes with which the module is shared</i>						
Teaching methods	<i>Lecture, Lesson, Project, Blended-learning and teaching</i>						
Workload (incl. contact hours, self-study hours)	<p><i>(Estimated) Total workload: 140</i></p> <p><i>Contact hours (please specify whether lecture, exercise, laboratory session, etc.):</i></p> <table> <tr> <td><i>Lecture:</i></td><td><i>33</i></td></tr> <tr> <td><i>Exercise:</i></td><td><i>6</i></td></tr> <tr> <td><i>Project:</i></td><td><i>27</i></td></tr> </table> <p><i>Private study including examination preparation, specified in hours:</i> <i>99</i></p>	<i>Lecture:</i>	<i>33</i>	<i>Exercise:</i>	<i>6</i>	<i>Project:</i>	<i>27</i>
<i>Lecture:</i>	<i>33</i>						
<i>Exercise:</i>	<i>6</i>						
<i>Project:</i>	<i>27</i>						
Credit points	<i>ECTS: 4.5</i>						
Required and recommended prerequisites for joining the module							

Module objectives/intended learning outcomes	<p>1. Explain, distinguish concepts, processes, and methods to solve problems in projects</p> <p>2. Apply various approaches to assess a project's feasibility</p> <p>3. Apply various methods in managing projects</p> <p>4. Demonstrate presentation skills</p>
Content	<p>The course PM provides fundamental knowledge and skills of project management such as analyzing and selecting alternatives, planning, scheduling, monitoring, and controlling a project. Varied approaches which are used to deal with problems rising in the progress of a project are also mentioned.</p>
Exams and assessment formats	<p>In-class short quizzes: 4 quizzes Written Midterm Exam: 50 minutes Written Final Exam: 70 minutes</p> <p>Written Group Project</p>
Study and examination requirements	<p>The final grade in the module is composed of 30% performance on midterm exam, 40% final exam, 10% quizzes, 20% group project. To pass the module, students must have a final grade of 50% or higher.</p>
Reading list	<p>[1] Larson E.W. & Gray C. F. (2018). Project Management: The Managerial Process (7th ed.). McGraw-Hill International Edition.</p> <p>[2] Project Management Institute (2017). A Guide to the Project Management Body of Knowledge - PMBOK Guide (6th ed.). Newtown Square, Pennsylvania.</p> <p>[3] C.H.Thi & N.T.Q.Loan (2011). Quản lý dự án. Nhà xuất bản Đại học Quốc gia TP.HCM.</p> <p>[4] Heagney, Joseph (2018). Quản trị dự án – Những nguyên tắc căn bản. Nhà xuất bản công thương.</p>

	<p>[5] Tài liệu biên soạn của giảng viên môn học/ <i>Lecture notes.</i></p> <p>[6] The Stationery Office (2009). <i>Managing Successful Projects with PRINCE2™ (5th ed.)</i>. United Kingdom.</p> <p>[7] Joseph, H. (2016). <i>Fundamentals of Project Management (5th ed.)</i>. American Management Association, New York.</p>
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¹ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Module Handbook for Engineering Economics

Module designation	<i>Engineering Economics</i>
Semester(s) in which the module is taught	
Person responsible for the module	<i>Ha Van Hiep</i>
Language	<i>English</i>
Relation to curriculum	<i>Elective</i>
Teaching methods	<i>lecture, lesson, project</i>
Workload (incl. contact hours, self-study hours)	<p><i>(Estimated) Total workload: 180</i></p> <p><i>Contact hours: Lecture: 27; Exercise: 9; Project 40.5;</i></p> <p><i>Private study including examination preparation, specified in hours¹: 103.5</i></p>
Credit points	<i>3</i>
Required and recommended prerequisites for joining the module	<i>none</i>
Module objectives/intended learning outcomes	<p>After studying this subject, Student could:</p> <ol style="list-style-type: none"> 1. Explain economics thinking in selection by considering about opportunity costs, cost of capital, and calculate the time value of money 2. Applying tools and techniques in appraising project from aspect of financial feasibility 3. Analysis project from viewpoints of before and after tax

<p>Content</p>	<p>The course includes:</p> <ul style="list-style-type: none"> - Analyze cash flows to obtain equivalent values for a different time point or time frame. - Understand engineering economic decision criteria, including net present value, internal rate of return, and benefit cost ratio. - Form alternatives and derive valid cost/benefit estimations from available data. - Perform after tax cash flow analysis, applying standard depreciation accounting rules. <p>This course includes time value of money, equivalence, economic measures of worth, selection rules for alternatives, income taxes and equipment depreciation.</p>
<p>Exams and assessment formats</p>	<ul style="list-style-type: none"> • Final exam about 90 minutes including about 30 MCQ and 1 case for analysis • Midterm exam about 60 minutes including about 30 MCQ • Short computer-based quizzes and 01 home project assignment
<p>Study and examination requirements</p>	<ul style="list-style-type: none"> • Process evaluation (Quiz, exercise) 10% • Individual project: 10% • Midterm evaluation (Multiple choice/Writing): 30% • Final evaluation (Multiple choice/Writing): 50% <p><i>Students must have a final grade of 50% or higher to pass</i></p>

Reading list	<p>[1] Sullivan, G.W. (2018), <i>Engineering Economy</i>, Pearson.</p> <p>[2] Nguyễn Như Phong (2011), <i>Kinh tế kỹ thuật</i>, Đại học quốc gia TpHCM</p>
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¹ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Module Handbook for Business Administration for Engineers

Module designation	Business Administration for Engineers
Semester(s) in which the module is taught	
Person responsible for the module	<i>Lai Van Tai</i>
Language	<i>English</i>
Relation to curriculum	<i>Elective</i>
Teaching methods	<i>lecture, lesson, project</i>
Workload (incl. contact hours, self-study hours)	<p><i>(Estimated) Total workload: 180</i></p> <p><i>Contact hours: Lecture: 27; Exercise: 9; Project 40.5;</i></p> <p><i>Private study including examination preparation, specified in hours¹: 103.5</i></p>
Credit points	3
Required and recommended prerequisites for joining the module	<i>none</i>
Module objectives/intended learning outcomes	<p>After studying this subject, Student could:</p> <ol style="list-style-type: none"> 1. Recognize the importance of management knowledge and social science on an engineer and their roles/ contribution in an enterprise. 2. Explain the concepts, activities and basic functions of a business 3. Demonstrate good teamwork and presentation skills

Contents	<p>The course is conducted by introducing models, objectives and basic functions of a business. Next, the main business functions will be mentioned including accounting/financial management, human resource management, marketing management, productions & operation management, and quality management. The course also includes the contents of decision making of managers in contents of project management.</p>
Exams and assessment formats	<ul style="list-style-type: none"> • Final exam about 80 minutes including about 30 MC questions and 2 cases/ problems for analysis and solving • Midterm exam about 60 minutes including about 30-45 MC questions • Short computer-based quizzes, in class exercises and 01 home group project assignment with presentation and final report
Study and examination requirements	<ul style="list-style-type: none"> • Process evaluation (Quiz, exercise) 15% • Group project: 15% • Midterm evaluation (Multiple choice/Writing): 30% • Final evaluation (Multiple choice/Writing): 40% <p><i>Students must have a final grade of 50% or higher to pass</i></p>

¹ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to le