VIETNAM NATIONAL UNIVERSITY HO CHI MINH CITY
HO CHI MINH CITY UNIVERSITY OF TECHNOLOGY

KHOA: KỸ THUẬT GIAO THÔNG
FACULTY OF TRANSPORTATION ENGINEERING

Ngành: Kỹ thuật Hàng không
Major: Aerospace Engineering

Module Handbook

Module Handbook

Module designation	*CH1003 - General Chemistry*
Semester(s) in which the module is taught	*Can be registered since the first year* *In the study plan: Semester 1*
Person responsible for the module	*003106 - Nguyễn Tuấn Anh*
Language	*Vietnamese/English*
Relation to curriculum	*Compulsory* *Mathematics and Basic Sciences*
Teaching methods	*Project-Based Learning* *Practice-Based Learning* *Blended Learning*
Workload	*Lectures: 30 hours* *Labs: 20 hours* *Projects: 15 hours* *Self-study: 70 hours* *Others: 15 hours* *Total: 150 hours* *Others: the number of hours for examination and preparation for the examination or the number of hours for defense and writing reports*
Credit points	*Vietnamese Credit: 3 (6 ECTS)*
Required and recommended prerequisites for joining the module	
Module objectives Intended learning outcomes	*This subject generally supplies the basic knowledge of Chemistry, and the students can understand other foundation chemistry subjects (Inorganic, Organic, Physical-Chemistry, Analytical) and apply in their fields.* *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: 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.* *- 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.*

Exams and assessment formats	*Experiments: 20%* *Projects/Assignments: 10%* *Midterm Exam: 20%* *Final Exam: 50%* *Midterm Exam: Multiple Choices 50 mins.* *Final Exam: Multiple Choices 70 mins.*
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 assignments on time.*
Reading list	*Materials of the subject (lecture slides) can be downloaded from BKEL page. Students can also use the following documents:* *Text books:* *[1] Nguyễn Đình Soa, Hóa Đại Cương, NXB Đại học Quốc Gia Tp. HCM, 2017. Call No. 540 N5764S 2016 c.3* *[2] Huỳnh Kỳ Phương Hạ, Nguyễn Sơn Bạch, Trần Minh Hương, Nguyễn Thị Bạch Tuyết, Lê Minh Viễn, Nguyễn Tuấn Anh, Nguyễn Minh Kha, Nguyễn Lệ Trúc, Bài tập trắc nghiệm Hóa đại cương, NXB. Đại học Quốc gia Tp.HCM, 2019. Call No. 540.76 B152T 2019* *[3] Ngô Văn Cờ, Huỳnh Kỳ Phương Hạ, Lê Minh Viễn, Nguyễn Tuấn Anh, Thí nghiệm hóa đại cương NXB Đại học Quốc gia Tp.HCM, 2017. Call No. 540.078 NG-C* *[4] Nguyen Tuan-Anh, Huynh Ky Phuong Ha, Le Minh Vien, Laboratory experiments in general chemistry, VNU-HCM Press, Ho Chi Minh, 2020. Call No. 660.078 NG-A* *References:* *[1] Hoàng Nhâm, Hóa học vô cơ cơ bản, Tập 1, NXB Giáo dục, Hà Nội, 2018. Call No. 546 HO- N 2018 tI* *[2] David W. Oxtoby, H.P. Gillis, Alan Campion, Principles of Modern Chemistry, 7th edition, Thomson Brooks/Cole, 2012. Call No. 540 OX-D* *[3] Darrell D. Ebbing and Steven D. Gammon, General Chemistry, 11th edition, Houghton Mifflin Company, New York, 2016. Call No. 540 E154D*

Course designation	*Introduction to Computer Programming*
Semester(s) in which the course is taught	*5*
Person responsible for the course	*Dr. Chau Thi Ngoc Vo*
Language	*Vietnamese*
Relation to curriculum	*Elective*
Teaching methods	*lecture, lesson*
Workload (incl. contact hours, self-study hours)	*Total workload (Hours): 150* *-Lectures: 30* *-Tutorial/Exercise:* *-Labs/Practice: 20* *-Mini Project: 15* *-Others: 15* *-Self-Study: 70*
Credit points	*3 (ECTS: 6)*
Required and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	*This course is a comprehensive introductory course that is intended for students who have no background in computer programming. Basic programming techniques are also covered in this course. It also helps students to practice programming skills for using C/C++ language.*
Content	● *Overview knowledge on computer and computer programming* ● *Data types in C/C++, including number, character, string, Enum, array, pointer and file.* ● *Input and output in C/C++* ● *Control structures* ● *Program organization*
Exams and assessment formats	*- Short computer-based quizzes* *- One final exam (90 minutes)* *- Mini essay (work in group and give presentation at class)*
Study and examination requirements	*Requirements for successfully passing the course:* *The final grade in the course is composed of 40% performance on final exams, 30% exercises and 30% mini essay.*
Reading list	*[1] "C: How to Program", 7th Ed. – Paul Deitel and Harvey Deitel, Prentice Hall, 2012.* *[2] Fundamentals of C++ Programming – Richard L.Halterman, Southern Adventist University 2010.*

Module designation	*Electrical and Electronics Engineering*
Semester(s) in which the module is taught	*4th semester*
Person responsible for the module	*Ing. Nguyen The Kiet, PhD.*
Language	*Vietnamese*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture, project, seminar.*
Workload (incl. contact hours, self-study hours)	*Total workload (Hours): 150* *-Lectures: 45* *-Tutorial/Exercise:* *-Labs/Practice:* *-Mini Project:* *-Others: 15* *-Self-Study: 90*
Credit points	*3 credits (ECTS: 6)*
Required and recommended prerequisites for joining the module	*None*
Module objectives/intended learning outcomes	*- Apply knowledge of mathematics: Complex number and vector diagram; Apply knowledge of physics* *- Define and solve for power and apply power factor correction in single and three phases system.* *- Discuss the construction of transformers, induction motors, synchronous machines and DC motors. Represent them by their electric equivalent circuits and determine their performance.* *- Analyse the power distribution diagram of electrical machines. -* *- Apply the characteristics of electrical machines for operating.* *- Analyse the rectifier circuits using by diodes, the regulator circuits using by diodes zener and the Opamp application circuits.*

Content	*Providing the basic knowledge and the skills of the electrical engineering. and electronics engineering.* *This course expose students about the three following fields:* *1.ANALYSIS CIRCUITS IN STEADY STATE.* *The first field begins with fundamental definitions, circuit elements including independent sources, circuit law and theorems and analysis techniques such as node voltage and mesh current methods. These theorems and methods are initially applied to DC-resistive circuits and then extended to RLC circuits by the use of complex impedance. Final, phasor analysis, sinusoidal steady state, power, power factor and polyphase circuits are thoroughly covered* *2. ELECTRIC MACHINES.* *The second field that is the chief objective of electric machinery, continues to be to build a strong foundation in the basic principles of electromechanics and electric machinery. The emphasis of electric machinery has been on both physical insight and analytical techniques.* *The course deals with the fundamental principles underlying the operation of single- phase transformer, three-phases induction motor, three-phases synchronous alternator, DC generator and DC motors. The emphasis is on the physical understanding as the basis for the derived equivalent machine circuit diagrams.* *3. FUNDAMENTAL DEVICES AND ELECTRONICS CIRCUITS.* *The final field provide the utilization of electronic control devices in circuit applications such as : Rectifier Diode, Zener, Transistor and Opamp. Beginning with the terminal characteristics of electronic control devices. Other topics are dealt with only as necessary to an understanding of these terminal characteristics.* *Each chapter in this field contains a brief review of pertinent topics along with governing equations and laws, with examples inserted to immediately clarify and emphasize principles as introduced.*
Exams and assessment formats	*- Mid-term test: multiple choice* *- Final exam: multiple choice* *- Homework or e-learning* *- Group assignments - group project or presentation.*
Study and examination requirements	*Requirements for successfully passing the module* *the final grade in the module is composed of 10% performance on homework, 30% midterm test, 10% group project and 50% final exam.*
Reading list	*[1] CHRISTOPHER R ROBERTSON: FUNDAMENTAL ELECTRICAL AND ELECTRONIC PRINCIPLES, Elvesier Ltd – Newnes – 2008* *[2] ROBERT L. BOYLESTAD - LOUIS NASHELSKY: Theory and Problems of ELECTRONIC DEVICES AND CIRCUITS, 11th edition - Prentice Hall, Inc – 2013* *[3] A.E.FITZGERALL et al., ELECTRIC MACHINERY, 7th edition – The McGraw-Hill Companies. Inc – 2013* *[4] NGUYỄN KIM ĐÍNH: KỸ THUẬT ĐIỆN, Nhà xuất bản Đại-Học Quốc-Gia Tp.Hồ-Chí Minh – 2012*

Module designation	*Humans and the Environment*
Semester(s) in which the module is taught	*8*
Person responsible for the module	*Ho Thi Ngoc Ha*
Language	*Vietnamese*
Relation to curriculum	*Compulsory* *Names of other study programmes with which the module is shared*
Teaching methods	*Lecture, lesson, discussion, presentation*
Workload (incl. contact hours, self-study hours)	*Total workload (Hours): 150* *-Lectures: 30* *-Tutorial/Exercise: 12* *-Labs/Practice:* *-Mini Project: 27* *-Others: 15* *-Self-Study: 66*
Credit points	*3 (ECTS: 6)*
Required and recommended prerequisites for joining the module	*None*
Module objectives/intended learning outcomes	• *Understanding the basic concepts of environmental science;* • *Recognizing/detecting signs of risk factors and their effects on people and the environment;* • *Understanding the environmental regulations;* • *Developing communication and teamwork skills.*
Content	*This module provides students with basic knowledge about environment and natural resources; the interaction between people and the environment; as well as providing knowledge on regulations and solutions to protect the environment and conserve natural resources.*
Exams and assessment formats	• *Assignments: in-class assignments or homework* • *Presentation: teamwork* • *Final exam: multi-choice test*
Study and examination requirements	• *Assignments: 30%* • *Presentation: 20%* • *Final exam: 50%*
Reading list	• *Nguyễn Xuân Cự, Nguyễn Thị Phương Loan (2014).* Giáo trình Môi trường và Con người. *NXB Giáo dục Việt Nam.* • *Peter H. Raven, Linda R. Berg, David M. Hassenzahl (2010).* Environment. *7th Edition.*

45. Project Management for Engineers **IM1025**

Module designation	*Project Management For Engineers*
Semester	*4th*
Person responsible for the module	*Nguyen Thuy Trang*
Language	*English; Vietnamese*
Relation to curriculum	*Elective (A)*
Teaching methods	*Lecture, lesson, group discussion, presentation*
Workload (incl. contact hours, self-study hours)	*Total workload (Hours): 150* *-Lectures: 30* *-Tutorial/Exercise: 0* *-Labs/Practice: 0* *-Mini Project: 45* *-Others: 15* *-Self-Study: 60*
Credit points	*3 (6 ECTS)*
Required and recommended prerequisites for joining the module	*None*
Module objectives/intended learning outcomes	*Upon completion of the module, students will be able to": To increase management component in a project team environment, this course will equip learners with general project management skills to help her/him to deal with problems in any field of work. Learners will also gain practical experience of using project management techniques in managing a project*
Content	*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.* *- Explain, distinguish concepts, processes, and methods to solve problems in projects* *- Apply various approaches to assess a project's feasibility* *- Apply various methods in managing projects* *- Demonstrate presentation skills*
Exams and assessment formats	*Multiple choice questions: one Midterm test (50 min), one Final exam (50 min); in-class and online quizzes,, take-home written assignments.*
Study and examination requirements	*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*
Reading list	*[1] Larson E.W. & Gray C. F. (2021). Project Management: The Managerial Process (8th ed.). McGraw-Hill International Edition.* *[2] Project Management Institute (2021). A Guide to the Project Management Body of Knowledge - PMBOK Guide (7th ed.). Newtown Square, Pennsylvania.*

	[3] *Heagney, Joseph (2018). Quản trị dự án – Những nguyên tắc căn bản. Nhà xuất bản công thương* [4] *The Stationery Office (2017). Managing Successful Projects with PRINCE2. United Kingdom.* [5] *Joseph, H. (2016). Fundamentals of Project Management (5th ed.). American Management Association, New York.*

46. Engineering Economics **IM1027**

Module designation	*Engineering Economics*
Semester	*4th*
Person responsible for the module	*Lai Huy Hung* *Tran Duy Thanh* *Pham Tien Minh*
Language	*English; Vietnamese*
Relation to curriculum	*Elective (A)*
Teaching methods	*Lecture, lesson, group discussion, presentation*
Workload (incl. contact hours, self-study hours)	*Total workload (Hours): 150* *-Lectures: 30* *-Tutorial/Exercise: 0* *-Labs/Practice: 0* *-Mini Project: 45* *-Others: 15* *-Self-Study: 60*
Credit points	*3 (6 ECTS)*
Required and recommended prerequisites for joining the module	*None*
Module objectives/intended learning outcomes	*After completing the course, learners are able to - Explain the basic economic concepts - Explain supply, demand and market interaction - Explain and analyse firm behaviors in different market structures - 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	- *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.*
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	*[[1] Mankiw, N. G. (2017). Principles of economics. Cengage Learning.* *[2] Karl, E., Case, F., Oster, R., & Sharon, E. (2017). Principles of Economics. Pearson*

47. Strength of Materials **CI2001**

Module designation	*Strength of Materials*
Semester	*4th*
Person responsible for the module	*Nguyen Hong An* *Nguyen Thai Binh* *Luong Van Hai* *Cao Van Vui*
Language	*English; Vietnamese*
Relation to curriculum	*Elective (B1)*
Teaching methods	*lecture, lab works*
Workload (incl. contact hours, self-study hours)	*Total workload (Hours): 150* *-Lectures: 30* *-Tutorial/Exercise: 0* *-Labs/Practice: 20* *-Mini Project: 15* *-Others: 15* *-Self-Study: 70*
Credit points	*3 (6 ECTS)*
Required and recommended prerequisites for joining the module	*None*
Module objectives/intended learning outcomes	*- An ability to identify, formulate and solve complex engineering problems by applying principles of mathematics, science and engineering.* *- Determine calculation diagrams for real structures; modeling external loadings and actions; Determine reaction forces; drawing internal force diagrams for bars and beams* *- 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* *- 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* *- An ability to design and conduct appropriate experimentation, analyze and interpret data in the field of engineering.* *- 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*
Content	*The description of the contents should clearly indicate focus areas and the level of difficulty.* *CHAPTER 1A. BASIC CONCEPTS:* *The concept of the subject (tasks, objects); Object classification, basic deformation classification; Basic assumptions; External loadings, types of supports and reactions; Equilibrium Equations.* *CHAPTER 1B. INTERNAL FORCE THEORY**:**

Business Administration for Engineers **Course ID: IM3001**

Module designation	*Business Administration for Engineers*
Semester(s) in which the module is taught	*7-8*
Person responsible for the module	*Lai Van Tai*
Language	*English*
Relation to curriculum	*Elective*
Teaching methods	*lecture, lesson, project*
Workload (incl. contact hours, self-study hours)	*-Total workload (Hours): 150* *-Lectures: 30* *-Tutorial/Exercise:* *-Labs/Practice:* *-Mini Project: 45* *-Others: 15* *-Self-Study: 60*
Credit points	***3 (ECTS: 6)***
Required and recommended prerequisites for joining the module	*none*
Module objectives/intended learning outcomes	After studying this subject, Student could: 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	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.
Exams and assessment formats	• 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	• Process evaluation (Quiz, exercise) 15% • Group project: 15% • Midterm evaluation (Multiple choice/Writing): 30% • Final evaluation (Multiple choice/Writing): 40% *Students must have a final grade of 50% or higher to pass*
Reading list	***1.*** Tập thể giảng viên khoa Quản lý Công nghiệp – ĐH Bách Khoa Tp.HCM (2015), ***Quản lý dành cho kỹ sư*** 2. W. P. Nel et al. (2015). *Management for Engineers, Technologists and Scientists* (3rd edition). JUTA publishing.

ENGLISH 1 **Course ID: LA1003**

Module designation	*ENGLISH 1*
Semester(s) in which the module is taught	*1*
Person responsible for the module	*Hoàng Võ Bích Phương*
Language	*English*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture, lesson, group discussion, presentation*
Workload (incl. contact hours, self-study hours)	Total workload (Hours): 100 -Lectures: -Tutorial/Exercise: 45 -Labs/Practice: -Mini Project: 22.5 -Others: 10 -Self-Study: 22.5
Credit points	*2 (ECTS: 4)*
Required and recommended prerequisites for joining the module	*None*
Module objectives/intended learning outcomes	*Upon completion of the module, students will be able to"* - *Knowledge: 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	*Authentic materials and motivating stories regarding the topics of where their Heart is, Health and Happiness, Learning, and Family and Friends.*
Exams and assessment formats	*Multiple choice questions: one Midterm test (50 min), one Final exam (50 min); in-class and online quizzes, take-home written assignments.*
Study and examination requirements	*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.*
Reading list	*Douglas, N., & Morgan. J. (2018). Perspectives 1. Cengage Learning.*

Module designation	*English 2*
Semester(s) in which the module is taught	*2*
Person responsible for the module	*Nguyen Thanh Thuy*
Language	*English*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture, lesson, group discussion, presentation.*
Workload (incl. contact hours, self-study hours)	*Total workload (Hours): 100* *-Lectures:* *-Tutorial/Exercise: 45* *-Labs/Practice:* *-Mini Project: 22,5* *-Others: 10* *-Self-Study: 22,5*
Credit points	*2 (ECTS: 4)*
Required and recommended prerequisites for joining the module	*English 1*
Module objectives/intended learning outcomes	*Upon completion of the module, students will be able to:* • *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	*Authentic materials and motivating stories regarding the topics of emotions, travel, sports, food, and work, at intermediate levels.*
Exams and assessment formats	*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	*The final grade in the module is composed of:* • *50% performance on final exams,* • *20% on midterm test,* • *20% on in-classes participation and quizzes and, take-home assignments,* • *10% on online quizzes*
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)	Total workload (Hours): 100 -Lectures: -Tutorial/Exercise: 45 -Labs/Practice: -Mini Project: 22.5 -Others: 10 -Self-Study: 22.5
Credit points	2 *(ECTS: 4)*
Required and recommended prerequisites for joining the module	English 2
Module objectives/intended learning outcomes	Upon completion of the module, students will be able to: - 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	• 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	The final grade in the module is composed of: • 50% performance on final exams, • 20% on midterm test, • 20% on in-classes participation and quizzes and, take-home assignments, • 10% on online quizzes
Reading list	Lansford, L., Barber, D., & Jeffries, A. (2018), *Perspective 2A: Compo Split*, Cengage ELT.

Module designation	***ENGLISH 4***
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)	*Total workload (Hours): 100* *-Lectures:* *-Tutorial/Exercise: 45* *-Labs/Practice:* *-Mini Project: 22.5* *-Others: 10* *-Self-Study: 22.5*
Credit points	*2 (ECTS: 4)*
Required and recommended prerequisites for joining the module	*English 4*
Module objectives/intended learning outcomes	*Upon completion of the module, students will be able to:* • *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	*Authentic materials and motivating stories regarding the topics of superhuman, shopping, communication, entertainment, and time, at intermediate levels*
Exams and assessment formats	*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	*The final grade in the module is composed of:* • *50% performance on final exams,* • *20% on midterm test,* • *20% on in-classes participation and quizzes and, take-home assignments,* • *10% on online quizzes*
Reading list	*Lansford, L., Barber, D., & Jeffries, A. (2018), Perspective 2B: Compo Split, Cengage ELT.*

Course designation	*Thermodynamics and Heat Transfer*
Semester(s) in which the course is taught	*6, 7, 8*
Person responsible for the course	Dr. Ha Anh Tung
Language	*Vietnamese*
Relation to curriculum	*Elective*
Teaching methods	*lecture, lesson*
Workload (incl. contact hours, self-study hours)	*Total workload (Hours): 150* *-Lectures: 30* *-Tutorial/Exercise:* *-Labs/Practice: 20* *-Mini Project: 15* *-Others: 15* *-Self-Study: 70*
Credit points	*3 (ECTS: 6)*
Required and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	*The course is designed to equip students with the knowledge and skills necessary to apply fundamental principles on thermodynamics and heat transfer in the calculation and interpretation of real-world thermal applications such as: factories thermoelectricity, refrigeration and air conditioning systems, drying equipment, heat exchangers, etc...*
Content	*"Thermodynamic 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:* *+ Basic concepts: thermodynamic systems, property, state, process, heat and work, etc.;* *+ The first and second laws of thermodynamics;* *+ Ideal gas and related applications: Compressors and Internal engines;* *+ Pure substances and related applications: Vapor power cycles, Refrigeration and heat pump cycles;* *+ Moist air and related applications: Heating and cooling, Humidification and Dehumidification, Adiabatic mixing of airstreams, Drying processes.* *+ Introduction to heat transfer mechanisms: Conduction, Convection and Radiation;* *+ Steady and Transient heat conduction;* *+ Natural and forced convection;* *+ Radiation heat transfer;* *+ Heat exchangers.*
Exams and assessment formats	*- Practice exercise* *- Group assignment* *- One mid-term test (50 minutes)* *- One final exam (90 minutes)*

Study and examination requirements	*Requirements for successfully passing the course:* *The final grade in the course is composed of 50% performance on final exams, 20% mid-term test, 15% group project, 15% Labs/practice.*
Reading list	*[1] Hoàng Đình Tín, L ê Chí Hiệp, Nhiệt động lực học kỹ thuật, NXB Khoa học kỹ thuật,1997.* *[2] Hoàng Đình Tín, Truyền nhiệt và tính toán thiết bị trao đổi nhiệt, NXB Đại học kỹ thuật Tp HCM, 2001.* *[3] Hoàng Đình Tín, Bùi Hải, Bài tập Nhiệt động lực học kỹ thuật & truyền nhiệt, NXB Đại học Quốc gia Tp. HCM , 2002.* *[4] Michael J. M oran, Howard N. Shapiro, Fundamentals of Engineering Thermodynamics, 5th Edition, John Wiley & Sons, New York, 2006.* *[5] Yunus A. Cengel, Michael A . Boles, Thermodynamics: An engineering approach, McGraw-Hill, Inc., 1994.* *[6] Yunus A. Cengel, Heat Transfer: A Practical Approach, 2nd Edition, WCB McGraw-Hill, Boston, 2003.*

Module designation	Mechanical Engineering Drawing - ME2089
Semester(s) in which the module is taught	4
Person responsible for the module	Nguyen Van Thanh
Language	Vietnamese / English
Relation to curriculum	Compulsory
Teaching methods	Practise-based learning Blended learning
Workload (incl. contact hours, self-study hours)	Total workload: 200 hours - Lecture and exercise on class: 30 hours - Tutorial: 30 hours - Laboratory: 30 hours - Self Study: 90 hours - Others: 20 hours
Credit points	4 (8 ECTS)
Required and recommended prerequisites for joining the module	NA
Module objectives/intended learning outcomes	This subject provides students the basic knowledge of mechanical engineering drafting with orthographic and pictorial views, standards, rules that are applied in mechanical design. It also includes the abilities to draft (traditional design and computer aided design), read, understand and analyze the engineering drawings with Vietnamese standards. Students have ability to work independently in groups to draw acomplete design, including schematic drawings, assembly drawings and production drawings of simple mechanisms.

Content	This subject aims at providing the abilities of understanding technical ideas on the technical scheme, the skill to construct the engineering drawing complianced with TCVN and ISO by hand and by using CAD software. The subject provides the knowledge for using and geometrical construction with the drawing instruments and AutoCAD software, the standard of presentation of engineering drawing; base, standard, constructing and the skill of analysis, understanding drawing representation; constructing and understanding the assembly drawings. This subject provides students the basic knowledge to represent machine components such as: gears, worm gears, bearings, springs, screw joints, keys, welding joints on drawing. In addition, the subject also presents the method to establish the assembly drawings, production drawings and schematic drawings.
Exams and assessment formats	Tutorial: 30% Labs/Practices: 20% Final Exam: 50%
Study and examination requirements	Documents are uploaded to BKEL weekly. Students download, print, and bring with them to class. The final course score is assessed throughout the course of study, basically consisting of two component points: the process score (60%) and the final exam score (40%). + Practice : • Classwork (individual): 30% • Homework: + Experiments: 20% + Group assignment: + Final examination: 50% • Final examination: 50% + Conditions for taking the final exam: - Students are required to attend class lectures at least 80% (count of attendance). In addition, students must complete all homework assignments on time as well as complete group presentations. These are the necessary conditions for students to pass this course.

Reading list	Main textbooks: [1] Trần Hữu Quế, Đặng Văn Cứ, Nguyễn Văn Tuấn, Vẽ kỹ thuật Cơ khí tập 1&2, NXB Giáo dục, 2018. [2] Lê Khánh Điền, Vũ Tiến Đạt, Vẽ kỹ thuật Cơ khí, NXB ĐHQG Tp. HCM, 2015. Reference books: [3] Trần Hữu Quế, Nguyễn Văn Tuấn, Vẽ kỹ thuật theo tiêu chuẩn quốc tế, NXB Bách Khoa Hà Nội, 2017. [4] French, T. E., Mechanical drawing, McGraw-Hill Companies, 2020. [5] Nguyễn Đình Điện, Hình học hoạ hình, NXB Giáo Dục, 2018.

Calculus 1 **Course ID: MT1003**

Module designation	*Calculus 1*
Semester(s) in which the module is taught	*1*
Person responsible for the module	*Dr. Tran Ngoc Diem*
Language	*Vietnamese*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture, lesson, project.*
Workload (incl. contact hours, self-study hours)	*Total workload (Hours): 200* *-Lectures: 45* *-Tutorial/Exercise: 14* *-Labs/Practice:* *-Mini Project: 24* *-Others: 20* *-Self-Study: 97*
Credit points	*4 (ECTS: 8)*
Required and recommended prerequisites for joining the module	*None*
Module objectives/intended learning outcomes	*Upon completion of this course, students know how to:* – *Be able to recall definitions, properties, methods of calculating derivatives and integrals of single variable functions and ordinary differential equations.* – *Apply theory to solve practical problems.* – *Be able to work in groups*
Content	*Part 1: Theory of differentiation and integration of functions of one variable and their applications.* *Part 2: Ordinary differential equations and their applications.*
Exams and assessment formats	– *Quizzes.* – *One midterm test (50 minutes).* – *One project.* – *One final exam (100 minutes).*
Study and examination requirements	*Requirements for successfully passing the module* *The final grade in the course is composed of 50% performance on exams, 5% quizzes, 25% midterm test, 20% project.*
Reading list	– *Calculus 1, Nguyen Dinh Huy (Main author), Viet Nam National University, HCM City 2016 (in Vietnamese).* – *Calculus early transcendentals. James Stewart , 7e, Thomson Brooks Cole 2008.* – *Applied Calculus for managerial, life and social sciences brief approach – Soo T.Tan – Brooks Cole-Cengage learning 2008.*

Module designation	General Physics 1
Semester(s) in which the module is taught	*2*
Person responsible for the module	*Ly Anh Tu, Ph.D.*
Language	*Vietnamese, English*
Relation to curriculum	*Compulsory*
Teaching methods	*Ass. : Assignment, homework* *Project: group assignment* *Midterm test : multiple-choice* *Final exam: multiple-choice*
Workload (incl. contact hours, self-study hours)	*Total workload (Hours): 200* *-Lectures: 45* *-Tutorial/Exercise: 14* *-Labs/Practice:* *-Mini Project: 24* *-Others: 20* *-Self-Study: 97*
Credit points	*4 (ECTS:8)*
Required and recommended prerequisites for joining the module	*None*
Module objectives/intended learning outcomes	• *Presenting the basic knowledge of Physics A1 at the university level.* • *Applying scientific reasoning, logical thinking, as a basic for studying and researching the engineering specialties and technical specialties in the future.* • *Self-learning, researching, drafting and presenting (writing and speaking) the physics related topics.* • *Using computational programs to solve problems of physics.*
Content	*Introduction of the course*
	Mechanics *1. Fundamentals of kinematics* *2. Laws of motion* *3. Dynamics of particle systems* *Mechanics of rigid bodies*
	Thermodynamics *4. Thermodynamics of gas* *5. Laws of thermodynamics*
	Electricity *6. Electrostatics in free space* *7. Dielectrics and conductors*
	Magnetostatics *8. Magnetostatics in free space*

Exams and assessment formats	*Assignment; project (group assignment); Midterm test (multiple choice, problems- 70 minutes); Final exam (multiple choice, problems- 90 minutes).*
Study and examination requirements	- *Ass. : Assignment, homework* - *MTest: Midterm test (60')* - *Exam: Final Exam (90')* *- Project: group assignment*
Reading list	1. *Nguyen Thi Be Bay et al., General Physics A1, HCMUT Textbook, 2016.* 2. *Tran Van Luong et al., General Physics Practice A1, VNU-HCMC pub., 2018* *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:* 3. *Halliday, Resnick, Walker, Fundamental physics, Edu. Pub., 2000.* *Serway, Jewett: Physics for Scientists and Engineers – 10th Edition, Cengage, 2019.*

Module designation	*Calculus 2*
Semester(s) in which the module is taught	*2*
Person responsible for the module	*Dr. Nguyen Quoc Lan*
Language	*Vietnamese*
Relation to curriculum	*Compulsory*
Teaching methods	*lecture, lesson, project.*
Workload (incl. contact hours, self-study hours)	*Total workload (Hours): 200* *-Lectures: 45* *-Tutorial/Exercise: 14* *-Labs/Practice:* *-Mini Project: 24* *-Others: 20* *-Self-Study: 97*
Credit points	*4 (ECTS: 8)*
Required and recommended prerequisites for joining the module	*None*
Module objectives/intended learning outcomes	*Upon completion of this course, students know how to:* – *Be able to recall definitions, properties, methods of calculating derivatives and integrals of multivariable functions and series.* – *Apply theory to solve practical problems.* – *Be able to work in groups*
Content	*Part 1: Theory of differentiation and integration of multivariable functions and their applications.* *Part 2: Theory of number series and power series.*
Exams and assessment formats	– *Quizzes.* – *One midterm test (50 minutes).* – *One project.* – *One final exam (100 minutes).*
Study and examination requirements	*Requirements for successfully passing the module* *The final grade in the course is composed of 50% performance on exams, 5% quizzes, 25% midterm test, 20% project.*
Reading list	– *Calculus 2, Nguyen Dinh Huy (Main author), Viet Nam National University, HCM City 2016 (in Vietnamese).* – *Calculus early transcendentals. James Stewart, 7e, Thomson Brooks Cole 2008.* – *Applied Calculus for managerial, life and social sciences brief approach – Soo T.Tan – Brooks Cole-Cengage learning 2008.*

Course designation	*Linear Algebra*
Semester(s) in which the course is taught	*1 or 2*
Person responsible for the course	*Dr. Dang Van Vinh, Msc. Phan Thi Khanh Van*
Language	*Vietnamese, English*
Relation to curriculum	*compulsory*
Teaching methods	*lecture, lesson, project.*
Workload (incl. contact hours, self-study hours)	*Total workload (Hours): 150* *-Lectures: 30* *-Tutorial/Exercise: 14* *-Labs/Practice:* *-Mini Project: 24* *-Others: 15* *-Self-Study: 67*
Credit points	*3 (ECTS:6)*
Required and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	*Upon completion of this course, students know how to:* *- Understand main concept of linear algebra* *- Solve basis problems in linear algebra.* *- State and solve practice problems such as Markov model, Leslie model, Input Output model, Least square problem, …*
Content	*The subject provides students with fundamental knowledge:* *- Matrix algebra: matrix, determinant, rank, inverse of a square matrix, system of linear equations.* *- Vector spaces: Space, subspace, linear independence, basis and dimension* *- Euclidean space: inner product, orthogonal complement, orthogonal projection, Gram Schmidt process* *- Linear mapping, Kernel and Image of linear mapping, matrix representation of linear mapping.* *- Eigenvalues and eigenvectors, diagonalization, orthogonal diagonalization, quadratic form.*
Exams and assessment formats	*- One mid-term test (45 minutes)* *- Short exercises (in classroom)* *- One final exam (90 minutes)* *- Group homework (work in group and give presentation)* *- Project*
Study and examination requirements	*Requirements for successfully passing the course:* *The final grade in the course is composed of 50% performance on final exams, 5% exercises, 20% project, 25% mid-term test.*

Reading list	*[1] Dang Van Vinh. Textbook of Linear algebra, VNU HCM, 2020.* *[2] Nguyen Tien Dung. Linear algebra. Theory and applications, VNU HCM, 2018.* *[3] Strang G. Linear algebra and its applications, 4th edition, Thomson Brook/Cole, 2006.* *[4] Steven Leon. Linear Algebra with Applications, 7th Edition, Pearson Prentice Hall, 2006* *[5] David C. Lay, Linear Algebra and its applications, Addison - Wesley Publishing Company, New York, 1993.* *[6] Howard Anton, Chris Rorrer. Elementary Linear Algebra, application version, 10th edition, John Willey & Sons, 2010.*

Module designation	*Numerical Methods*
Semester(s) in which the module is taught	*3, 4*
Person responsible for the module	*Dr. Dau The Phiet*
Language	*Vietnamese, English*
Relation to curriculum	*Compulsory*
Teaching methods	*lecture, lesson, project*
Workload (incl. contact hours, self-study hours)	*Total workload (Hours): 150* *-Lectures: 30* *-Tutorial/Exercise: 14* *-Labs/Practice:* *-Mini Project: 24* *-Others: 15* *-Self-Study: 67*
Credit points	*3 (ECTS:6)*
Required and recommended prerequisites for joining the module	*Calculus 1, Calculus 2, Linear Algebra*
Module objectives/intended learning outcomes	*Upon completion of this course, students know how to / are able to:* - *State* basic definitions and results of functions of numerical analysis - Analyse and choose suitable tools to solve problems. - Use the software to solve mathematical problems. - Work in a team effectively
Content	The following topics will be presented and discussed in this course: - 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 Application of numerical methods in solving theoretical and applied problems. Solving all discussed problems by using computer software.
Exams and assessment formats	*Multichoice Midterm assessments (50 minutes) and a final exam (100 minutes), short computer-based quizzes, report for the project.*
Study and examination requirements	Requirements for successfully passing the module 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.

Reading list	[1] Burden, R.D and Faires, D., Numerical Analysis, Brooks/Cole Publishing Company. [2] Steven C.Chapra, Raymond P. Canale., Numerical methods for Engineers, McGraw-Hill Education.

Module designation	*Probability and Statistics*
Semester(s) in which the module is taught	*3,4*
Person responsible for the module	*Dr. Nguyen Tien Dung, Dr. Phan Thi Huong*
Language	*Vietnamese*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture, lesson, project.*
Workload (incl. contact hours, self-study hours)	*Total workload (Hours): 200* *-Lectures: 45* *-Tutorial/Exercise:* *-Labs/Practice:* *-Mini Project: 45* *-Others: 20* *-Self-Study: 90*
Credit points	*4 (ECTS:8)*
Required and recommended prerequisites for joining the module	*None*
Module objectives/intended learning outcomes	*Upon completion of this course, students know how to:* – *present definitions and formulas in Probability and Statistics.* – *analyze the questions and apply appropriate formulas into solving questions.* – *work in groups and present reports effectively.*
Content	*Part 1: Probability* *Part 2: Random variables and random vectors* *Part 3: Some special distributions* *Part 4: Confidence interval* *Part 5: Hypothesis testing for 1 and 2 samples* *Part 6: Anova* *Part 7: Linear regression models*
Exams and assessment formats	– *Quizzes.* – *One midterm test (50 minutes).* – *One project.* – *One final exam (100 minutes).*
Study and examination requirements	*Requirements for successfully passing the module* *The final grade in the course is composed of 40% performance on the final exam, 20% on midterm test, 25% on project, and 5% on practice.*
Reading list	– *Xác suất - Thống kê & phân tích số liệu. Nguyễn Tiến Dũng (chủ biên), Nguyễn Đình Huy.NXB Đại học Quốc gia TPHCM, 2019.* – *Applied Statistics and Probability for Engineers. Douglas C. Montgomery, George C. Runger. Hoboken, NJ: Wiley, 2007.*

Physical Education 1: TABLE TENNIS — Course ID: PE1003

Module designation	*Physical Education 1: TABLE TENNIS*
Semester(s) in which the module is taught	*1, 2, 3*
Person responsible for the module	***(Le Quang Khoi)***
Language	*Vietnamese*
Relation to curriculum	*elective*
Teaching methods	*lecture, lesson, exercise.*
Workload (incl. contact hours, self-study hours)	*- Total workload: 90* *- Theory : 20* *- Practice: 70* *Private study including examination preparation, specified in hours: 0*
Credit points	*0*
Required and recommended prerequisites for joining the module	*None*
Module objectives/intended learning outcomes	– *Law of table tennis , theory of basic technique* *Skills: complete practical subject* – *Competences: Students know how to play tennis table .*
Content	*- rules of table tennis* *- theory basic technique.* *- good practical skills*
Exams and assessment formats	*Students will complete subject by entirely of practical examination*
Study and examination requirements	*Students must reach at least 50% of practical test requirements, students must attend fully.*
Reading list	*- Giáo trình bóng bàn – trường đại học TDTT TPHCM 2016* *- Luật thi đấu bóng bàn – tổng cục TDTT năm 2016*

[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.

Physical Education 2: Volleyball **Course ID: PE1005**

Module designation	*Physical Education 2: Volleyball*
Semester(s) in which the module is taught	*1, 2, 3*
Person responsible for the module	***Nguyễn Đức Toàn***
Language	*Vietnamese*
Relation to curriculum	*elective*
Teaching methods	*lecture, lesson, exercise.*
Workload (incl. contact hours, self-study hours)	*- Total workload: 90* *- Theory : 20* *- Practice: 70* *Private study including examination preparation, specified in hours: 0*
Credit points	*0*
Required and recommended prerequisites for joining the module	*None*
Module objectives/intended learning outcomes	– *Law of Volley ball , theory of basic technique.* – *Skills: complete practical subject* – *Competences: Students know how to play volley ball*
Content	*- rules of volley ball* *- theory basic technique.* *- good practical skills*
Exams and assessment formats	*Students will complete subject by entirely of practical examination*
Study and examination requirements	*Final exam. Students must reach at least 50% of practical test requirements, students must attend fully.*
Reading list	*- giáo trình bóng chuyền – trường ĐH TDTT TPHCM 2017* *- Luật bóng chuyền - tổng cục TDTT 2017*

[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.

Physical Education 3: Basketball **Course ID: PE1007**

Module designation	*Physical Education 3: Basketball*
Semester(s) in which the module is taught	*1, 2, 3*
Person responsible for the module	***Trần Quang Vinh***
Language	*Vietnamese*
Relation to curriculum	*elective*
Teaching methods	*lecture, lesson, exercise.*
Workload (incl. contact hours, self-study hours)	*- Total workload: 90* *- Theory : 20* *- Practice: 70* *Private study including examination preparation, specified in hours: 0*
Credit points	*0*
Required and recommended prerequisites for joining the module	*None*
Module objectives/intended learning outcomes	– *Law of Basketball , theory of basic technique* *Skills: complete practical subject* – *Competences: Students know how to play basket ball*
Content	*- rules of Basket ball* *- theory basic technique.* *- good practical skills*
Exams and assessment formats	*Students will complete subject by entirely of practical examination*
Study and examination requirements	*Final exam. Students must reach at least 50% of practical test requirements, students must attend fully.*
Reading list	*- giáo trình bóng rổ – trường ĐH TDTT TPHCM 2016* *- Luật bóng rổ - tổng cục TDTT 2018*

[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	General Physics 1
Semester(s) in which the module is taught	*2*
Person responsible for the module	*Ly Anh Tu, Ph.D.*
Language	*Vietnamese, English*
Relation to curriculum	*Compulsory*
Teaching methods	*Ass. : Assignment, homework* *Project: group assignment* *Midterm test : multiple-choice* *Final exam: multiple-choice*
Workload (incl. contact hours, self-study hours)	*Total workload (Hours): 200* *-Lectures: 45* *-Tutorial/Exercise: 14* *-Labs/Practice:* *-Mini Project: 24* *-Others: 20* *-Self-Study: 97*
Credit points	*4 (ECTS:8)*
Required and recommended prerequisites for joining the module	*None*
Module objectives/intended learning outcomes	• *Presenting the basic knowledge of Physics A1 at the university level.* • *Applying scientific reasoning, logical thinking, as a basic for studying and researching the engineering specialties and technical specialties in the future.* • *Self-learning, researching, drafting and presenting (writing and speaking) the physics related topics.* • *Using computational programs to solve problems of physics.*
Content	*Introduction of the course*
	Mechanics *1. Fundamentals of kinematics* *2. Laws of motion* *3. Dynamics of particle systems* *Mechanics of rigid bodies*
	Thermodynamics *4. Thermodynamics of gas* *5. Laws of thermodynamics*
	Electricity *6. Electrostatics in free space* *7. Dielectrics and conductors*
	Magnetostatics *8. Magnetostatics in free space*

Exams and assessment formats	*Assignment; project (group assignment); Midterm test (multiple choice, problems- 70 minutes); Final exam (multiple choice, problems- 90 minutes).*
Study and examination requirements	- *Ass. : Assignment, homework* - *MTest: Midterm test (60')* - *Exam: Final Exam (90')* *- Project: group assignment*
Reading list	1. *Nguyen Thi Be Bay et al., General Physics A1, HCMUT Textbook, 2016.* 2. *Tran Van Luong et al., General Physics Practice A1, VNU-HCMC pub., 2018* *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:* 3. *Halliday, Resnick, Walker, Fundamental physics, Edu. Pub., 2000.* *Serway, Jewett: Physics for Scientists and Engineers – 10th Edition, Cengage, 2019.*

Module designation	General Physics 2
Semester(s) in which the module is taught	2
Person responsible for the module	Tran Van Luong, Ph.D.
Language	Vietnamese, English
Relation to curriculum	Compulsory
Teaching methods	● Assignment, homework ● Project: group assignment ● Midterm test : multiple-choice ● Final exam: multiple-choice
Workload (incl. contact hours, self-study hours)	Total workload (Hours): 200 -Lectures: 45 -Tutorial/Exercise: 14 -Labs/Practice: -Mini Project: 24 -Others: 20 -Self-Study: 97
Credit points	4 *(ECTS:8)*
Required and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	- Understanding well the basics of physics at the university level. At the end of the course, students will be able to realize the basic principles of electromagnetic (EM) induction, EM fields and Maxwell's equations, oscillations and waves, wave optics, quantum optics, basic of quantum mechanics, theory of relativity, atomic physics, nuclear physics. Student will able to understand the underlying physics concepts used in daily life. - Having a capacity of scientific reasoning, logic, as a basic for research and engineering in the future. - Having the capacity of self-learning, research, drafting and presentation (written and spoken) physics related topics.

Content	The main content covers the following basic knowledge of physics: - EM induction phenomenon: the physics of electromagnetic induction phenomenon. - EM field: the phenomenon of electromagnetic induction, the physics of the electromagnetic field and the properties of electromagnetic waves, Maxwell's equations. - Oscillations and mechanical waves: physics of oscillation (harmonic oscillation, forced oscillation, resonance oscillation) and sound wave. - Optical waves: physics about the wave properties of light, interference and diffraction. - Quantum optics: physics of the particle properties of light, thermal radiation and Compton effect. - The theory of relativity: relativity and relativistic dynamics. - Quantum mechanics: physics of wave- particle duality of matter, wave equation. - Atomic physics: atomic structure and movement of electrons in atoms. - Nuclear physics: nuclear structure and properties of nuclei, nuclear reactions, fundamental particles.
Exams and assessment formats	- Ass. : Assignment, homework - MTest: Midterm test (60') - Exam: Final Exam (90') - Project: group assignment
Study and examination requirements	To ensure academic results, students must: - Have textbooks, exercise books. - Attend all lectures in class - Complete homework assignments by deadline, implementation method and prescribed level - Organize group learning activities to complete project or presentations - Review regularly to avoid being passive at midterm and final exams. Method of assessing subjects: - Mid-term test: 30% - multiple choice - Final exam: 50% - multiple choice - Homework or e-learning: 10% - Project (calculated using a computer program) or group presentations: 10%.

Reading list	[1] Nguyen Thi Be Bay et al., General Physics A2, HCMUT Textbook, 2016. [2] Tran Van Luong et al., General Physics Practice A2, VNU-HCMC pub., 2017 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: [3] Halliday, Resnick, Walker, Fundamental physics , Edu. Pub., 2000. [4] H.D. Young, R.A. Freedman, University physics with modern physics, 13th ed., A-W, 2011.

Module designation	*General Physics Labs*
Semester(s) in which the module is taught	*2*
Person responsible for the module	*M.Sc. Tran Anh Tu / Dr.Eng. Tran Trung Nghia*
Language	*Vietnamese/English*
Relation to curriculum	*Compulsory*
Teaching methods	*lecture, lesson, lab works*
Workload (incl. contact hours, self-study hours)	*Total workload (Hours): 50* *-Lectures:* *-Tutorial/Exercise:* *-Labs/Practice: 30* *-Mini Project:* *-Others: 5* *-Self-Study: 15*
Credit points	*1 (ECTS:2)*
Required and recommended prerequisites for joining the module	*None*
Module objectives/intended learning outcomes	*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.* ***Course objectives:*** *This course helps students getting to:* *- master basic physics concepts by performing an experiment relevant to corresponding course work;* *- gain hands-on experiences with experimental processes and develop effective written communication skills;* *- develop collaborative learning skills by working in a group.* ***Intended learning outcomes:*** *On successful studying of this course, students can acquire the following learning outcomes:* *L.O.1 Demonstrating basic experimental skills by the practice of setting up and conducting an experiment;* *L.O.2 Demonstrating an understanding of the analytical methods required to interpret, analyze results, and draw conclusions as supported by experimental data;* *L.O.3 Demonstrating basic communication skills by working in groups on laboratory experiments and the thoughtful discussion and interpretation of data.*

Content	*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.* ***Orientation (lev. 1)[2]:*** *- Lab resources;* *- Safety. Plagiarism. Report writing.* ***Measurements and Uncertainties (lev. 2).*** ***Graphing (lev. 2).*** ***Precision measuring instruments (lev. 2).*** ***Laboratories (lev. 2):** 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).* *- Lab 1: determining density of rigid objects.* *- Lab 2: determining the gravitational acceleration with a reversible 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.* *- 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.* ***Discussion and report evaluation days** (at least 03 times).*
Exams and assessment formats	*- Pre-lab (15-minute quiz at the start of each session and preparation);* *- Lab works (attendance, participation);* *- Laboratory reports.*

Study and examination requirements	*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.* *1. The grading guidelines are as follows:* *Prelab (10%); Attendance (20%); Participation (20%); Laboratory Reports (50%).* *2. A grade of zero (0) will be given for any missed experiment with no excuse.* *3. Submission of the lab report is due the following week class begins – penalty for lateness is 10% per day.* *4. Laboratory Report Grading (points):* *- Style; font type, font size, line space, margin, etc. given by the lab instructor (0.5)* *- Title (0.5)* *- Introduction including Objective and Theoretical Background (0.5)* *- Experimental Procedure (0.5)* *- Results: Experimental Data (1.5) and Calculation (1.5)* *- Discussion and analysis of results; Answers to questions (3.5)* *- Conclusions (1.0)* *- 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.*
Reading list	*[1]. 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.* *[2]. 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.*

Module designation	*Introduction to Vietnamese Law*
Semester(s) in which the module is taught	*8*
Person responsible for the module	*Le Mong Tho*
Language	*Vietnamese*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture, Lesson, teamwork, homework, essay*
Workload (incl. contact hours, self-study hours)	*Total workload (Hours): 100* *-Lectures: 24* *-Tutorial/Exercise:* *-Labs/Practice:* *-Mini Project: 18* *-Others: 10* *-Self-Study: 48*
Credit points	*2 (ECTS:4)*
Required and recommended prerequisites for joining the module	*None*
Module objectives/intended learning outcomes	***About the knowledge:*** *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.* ***About the skills:*** *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.* ***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".*
Content	*- 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	- *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	- *Students must not be absent more than 20% of the total number of module's periods.* - *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.* - *Students have to watch all instructional videos and take quizzes with a score of 5 or higher for each.*
Reading list	*a. Main Textbooks* *Ministry of Education and Training (2019), General Law Textbook, University of Education Publishing House. b. References* *[1] Constitutional Law 2013; Administrative Law; Criminal Law 2015, Criminal Procedure Law 2015; Civil Law 2015, Civil Procedure Law 2015; Labor Law 2019.* *[2] Legal documents relating in each lesson.*

Module designation	Marxist - Leninist philosophy
Semester(s) in which the module is taught	1,2,3,4
Person responsible for the module	PhD. Nguyen Thi Minh Huong
Language	Vietnamese
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture,* essay, *seminar*
Workload (incl. contact hours, self-study hours)	*Total workload (Hours): 150* *-Lectures: 30* *-Tutorial/Exercise: 12* *-Labs/Practice:* *-Mini Project: 27* *-Others: 15* *-Self-Study: 66*
Credit points	3 *(ECTS:6)*
Required and recommended prerequisites for joining the module	*None*
Module objectives/intended learning outcomes	- 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	- 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	- Regular testing and assessment (BT): Attendance, discussion, presentation, exams, lesson contribution, BK eLearning… - Coursework: Essay - End-of-course exam: Open-ended questions exam (Examination time: 90 minutes).
Study and examination requirements	- Assignment: 20% (Attendance: 10%; Discussion or presentation: 10%). -Coursework: 30% (03Coursework /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 attendances checking), to complete all assignments and participate fully groupwork activities.
Reading list	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 Curriculum*, National Politics Publisher, Hanoi, 1999. 2. Ministry of Education and Training, *Marxist-Leninist Philosophy Curriculum (For students not majoring in Political Theory)*, National Politics Publisher, Hanoi, 2021. 3. Nguyen Thi Minh Huong, Le Duc Son, *Learning materials*: *Marxist-Leninist Philosophy*, (ISBN: 978 – 604 – 73 – 806) Vietnam National University – Ho Chi Minh City Publisher, 2021.

Module designation	*Marxist - Leninist Political Economy*
Semester(s) in which the module is taught	*2, 3, 4*
Person responsible for the module	*Vu Quoc Phong.*
Language	*Viet Nam*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture, group work, homework.*
Workload (incl. contact hours, self-study hours)	*Total workload (Hours): 100* *-Lectures: 24* *-Tutorial/Exercise:* *-Labs/Practice:* *-Mini Project: 18* *-Others: 10* *-Self-Study: 48*
Credit points	*2 (ECTS:4)*
Required and recommended prerequisites for joining the module	*Pre-study of Marxist-Leninist philosophy*
Module objectives/intended learning outcomes	*- Knowledge: Equipping students with basic knowledge about economic categories and laws to form economic thinking.* *- Skills: Formation of skills to apply, analyze and evaluate socio-economic issues in the development process of the country and the students.* *- Competences: Contribute to building stance, ideology, social responsibility of students in work and life.*
Content	*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.*
Exams and assessment formats	*- In-class participation: Regular testing and assessment, etc* *- Coursework: Essay.* *- Final Exam: Multiple choice (40 minutes).*
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.*
Reading list	*[01] Ministry of Education and Training. (2019). Textbook of Marxist - Leninist Political Economy. Hanoi: National Politics Publisher.* *[02] Ministry of Education and Training. (2006). Textbook of Marxist - Leninist Political Economy. Hanoi: National Politics Publisher.* *[03] Karl Marx – Engels. (2004). The Complete Series – Volume 20, 23, 25. Hanoi: National Politics Publisher.* *[04] Communist Party of Vietnam. (2016). Final report of some theoretical - practical issues during 30 years of innovation. Hanoi: National Politics Publisher.* *[05] Communist Party of Vietnam. (2016). Documents of 12th National Congress of the Communist Party of Vietnam. Hanoi: National Politics Publisher.* *[06] 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". *[07] Jeremy Rifkin. (2014). The Third Industrial Revolution. Hanoi: Labour and Society Publisher.* *[08] The Central Council's direction on the compilation of national textbook of Marxist- Leninist science courses, Ho Chi Minh's Ideology.(2004). Marxist-Leninist Scientific Socialism Textbook, Hanoi: National Politics Publisher.* *[09] Lenin. (2005). The Complete Series – Volume 3, 27, 31. Hanoi: National Politics Publisher.* *[10] Manfred B. Steger. (2011). Globalization. Hanoi: Knowledge Publisher.* *[11] Klaus Schwab. (2018). The Fourth Industrial Revolution. Hanoi: National Politics Publisher* *[12] Nguyen Hong Hai, Vu Quoc Phong, Nguyen Thi Thu Trang & Đo Thi Thuy Yen. (2016). The history of economic theoriesTextbook. Ho Chi Minh City: Publishing House of Ho Chi Minh City University of Education.* *[13] The Prime Minister. (2017). Directive No. 16/CT-TTg of the Prime Minister dated May 04th 2017 on "The strengthening of the ability to access the Fourth Industrial Revolution".* *[04] Furthermore, there are other learning materials on website BKEL: http://e-learning.hcmut.edu.vn*

SCIENTIFIC SOCIALISM Course ID: SP1035

Module designation	*SCIENTIFIC SOCIALISM*
Semester(s) in which the module is taught	*5*
Person responsible for the module	*PHD. THI NGOC TRINH AN*
Language	*Vietnamese*
Relation to curriculum	*Training program of Faculty: All faculties*
Teaching methods	*Interpretation, present, seminar….*
Workload (incl. contact hours, self-study hours)	*Total workload (Hours): 100* *-Lectures: 24* *-Tutorial/Exercise:* *-Labs/Practice:* *-Mini Project: 18* *-Others: 10* *-Self-Study: 48*
Credit points	*02 (ECTS:4)*
Required and recommended prerequisites for joining the module	*Marxist Leninist Political Economy*
Module objectives/intended learning outcomes	– *Knowledge: Students understand and master the most basic, fundamental knowledge of scientific socialism.* – *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* – *Competences: Students Building trust, right political attitudes and ideas about scientific socialism module in particular and the Party's ideology in general*
Content	*The scientific socialism subject of is one of the three components of Marxism – Leninism, as a result of applying the worldview, Marxist - Leninist methodology 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.*
Exams and assessment formats	*- Regular testing and assessment (assignment): 20% (Attendance, discussion, classroom tasks, BK eLearning…)* *- Coursework: 30% (Essay)* *- Final exam: 50% (Multiple-choice)*
Study and examination requirements	*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.*

Reading list	Coursebook: [1]. Ministry of Education and Training (2019). Scientific Socialism Coursebook (for higher education – not majoring in Political Science). Corrections and additions were added after pilot teaching. References: [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. [2]. Ministry of Education and Training (2006), Scientific Socialism Coursebook – Used in universities, colleges, National Politics Publisher, Ha Noi. [3]. An Thi Ngoc Trinh (2017), Building contemporary family culture in Vietnam , University of Education Publishing House, Ho Chi Minh City.

Module designation	Ho Chi Minh Ideology
Semester(s) in which the module is taught	*7*
Person responsible for the module	*Phan Duy Anh*
Language	*Vietnamese*
Relation to curriculum	Compulsory
Teaching methods	Lecture, group work, homework.
Workload (incl. contact hours, self-study hours)	Total workload (Hours): 100 -Lectures: 24 -Tutorial/Exercise: -Labs/Practice: -Mini Project: 18 -Others: 10 -Self-Study: 48
Credit points	*2 (ECTS:4)*
Required and recommended prerequisites for joining the module	*Pre-study of* History of Communist Party of Vietnam
Module objectives/intended learning outcomes	- *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.* - *Skills: Build and strengthen materialist worldview and dialectical methodology.* - *Attitudes: Raise national pride, be proud of Vietnam Communist Party and President Ho Chi Minh*
Content	*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.*
Exams and assessment formats	- *In-class participation: Regular testing and assessment, etc* - *Coursework: Essay.* - *Final Exam: Multiple choice (40 minutes).*
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.

Reading list	*Main textbooks:* *[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.* *[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).* *References:* *[3]. National Textbook Edition Council: Ho Chi Minh's Ideology Textbook, National Politics Publisher, Hanoi, 2004.* *[4]. Complete works of Ho Chi Minh, 15 volumes, National Politics Publisher, Hanoi, 2011.* *[4]. Selected Works of Ho Chi Minh, National Politics Publisher, Hanoi, 2004.* *[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.* *[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.* *[7]. Phan Duy Anh, Culture- A way to understand by Ho Chi Minh in Prison Diary, Nhip Cau Tri Thuc Magazine, Sep, 2013.* *[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.* - *[9]. Nguyen Van Khanh, Phan Duy Anh, Ho Chi Minh and talent issue, Communist Pars History Magazine, May, 2010.*

History of Vietnamese Communist Party Course ID: SP1039

Module designation	*History of Vietnamese Communist Party*
Semester(s) in which the module is taught	*6*
Person responsible for the module	*Nguyen Huu Ky Ty*
Language	*Vietnamese*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture, group work, homework*
Workload (incl. contact hours, self-study hours)	*Total workload (Hours): 100* *-Lectures: 24* *-Tutorial/Exercise:* *-Labs/Practice:* *-Mini Project: 18* *-Others: 10* *-Self-Study: 48*
Credit points	*2 (ECTS:4)*
Required and recommended prerequisites for joining the module	*Pre-study of Scientific socialism*
Module objectives/intended learning outcomes	- *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.* - *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 development; ability to work effectively as a team for a common goal.* - *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.*
Content	*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.*
Exams and assessment formats	- *In-class participation: Regular testing and assessment, etc* - *Coursework: Essay.* *Final Exam: Multiple choice (50 minutes).*

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.*
Reading list	*1. Ministry of Education and Training, Textbook of History of the Communist Party of Vietnam (for universities – non- specialized Political Science system), (waiting for textbooks of the Ministry of Education and Training).* *2. Ministry of Education and Training (2006), Textbook of History of the Communist Party of Vietnam (for universities and colleges), first reprinted edition, National Politics Publisher, Hanoi.* *3. Communist Party of Vietnam, Complete Documents of the Party, National Politics Publisher, Hanoi* *4. Dao Thi Bich Hong (2017), Southern Security Force during the anti-US period (Monograph book), Culture and Arts Publisher, Ho Chi Minh.* *Dao Thi Bich Hong (2019), Economic restructuring (A case study of Bac Lieu province) (Monograph book), Vietnam National University- Ho Chi Minh City Publisher.*

Introduction to Engineering **Course ID: TR1001**

Module designation	Introduction to Engineering - TR1001
Semester(s) in which the module is taught	1
Person responsible for the module	Tran Tien Anh
Language	Vietnamese / English
Relation to curriculum	Compulsory
Teaching methods	
Workload (incl. contact hours, self-study hours)	Total: 150 Lecture: 30 hours Projects: 45 hours Self-study: 60 hours Others: 15 hours
Credit points	3
Required and recommended prerequisites for joining the module	NA
Module objectives/intended learning outcomes	Engineers are problem solvers. Successful engineers possess good communication skills and are team players. Successful engineers have a good grasp of fundamentals, which they can use to understand and solve many different problems. The purpose of this course is to introduce students to the fields of aerospace engineering, naval architecture and marine engineering, automotive engineering & technology fundamental physical knowledges, computational tools, material selection criteria... for finishing their engineering design project. Students will apply the knowledge for completing an engineering design project in group. These projects will begin with conceptualization, proceed with the analysis of alternatives, and culminate in the construction and testing of a prototype (or scaling model). The creative process will be encouraged throughout teamwork activities for a design project.

Content	The course will focus on these engineering fundamentals. These are concepts that every engineer, regardless of his or her area of specialization, should know. From observation of our surroundings, it has been learned that we need only a few physical quantities to describe events and our surroundings. These quantities are length, time, mass, force, temperature, mole, and electric current. There are also many design variables that are related to these fundamental quantities. To become a successful engineer, students need to first fully understand these fundamental and related variables. Then, it is important for students to know how these variables are measured, approximated, calculated, or used in engineering formulas. Two computational tools (Microsoft Excel and Matlab) that are commonly used by engineers to solve engineering problems will be introduced. These computational tools are used to record, organize, analyze data using formulas, and present the results of an analysis in chart forms. Matlab is also versatile enough that students can use it to write their own program to solve complex problems. The principles and rules of engineering graphical communication and engineering symbols will be also introduced. Engineers use technical drawings to convey useful information to others in a standard manner. An engineering drawing provides information, such as the shape of a product, its dimensions, materials from which to fabricate the product, and assembly steps. Some engineering drawings are specific to a particular discipline. Engineers also use special symbols and signs to convey their ideas, analyses, and solutions to problems As an engineer, whether they are designing a machine part, a toy, a frame of a car, a structure, or artificial limbs the selection of materials is an important design decision. Students have to study materials such as metals and their alloys, plastics, glass, wood, composites that commonly are used in various engineering applications. Some of the basic characteristics of the materials that are considered in design will also be discussed. Engineers are problem solvers. They have a good grasp of fundamental physical and chemical laws and mathematics and apply these laws and principles to design, develop, test, and supervise the manufacture of millions of products and services. Engineers, regardless of their background, follow certain steps when designing the products and services (engineering design process) we use in our everyday lives. Successful engineers possess good communication skills and are team players (engineering communication).
Exams and assessment formats	Tutorial: 25 % Projects: 75 %

Study and examination requirements	All learning resources related to this course will be informed in the first week of the course program. Student should prepare material at home in order to participate in active learning activities (student should be the center of teaching and learning activities) such as question & answers, project based discussion in group, etc. Students are evaluated throughout the course. Final grade will be as follows: + Process score by multiple choice quiz: 25% of total grade + Team cooperation, team working skills: 25% of total grade + Project results: 50% of total grade: - Reports on engineering design project (poster, technical report, and short video clip) - Results of project assignments (designed products) - Presentation (Engineering Day) Course requirement: - Students must complete a final engineering design projects in teamworking. - Project assignments must be presented at the Engineering Day of the Faculty of Transport Engineering. Final technical reports should be repaired according to the suggestions and comments of classmates and instructor, it must be submitted at the end of semester. - There is no exception for submitting report lately unless having legitimate reasons Students do the project in groups (about 5 students/ group, each lecturer takes on the instruction of 2 groups). Students will discuss with their instructors to complete the project and will present the final results of the engineering design project on the Engineering Day of the Faculty of Transport Engineering at the end of the semester. Instructions for grading on the Engineering Day: + Deployment method of part manufacturing from technical drawings + Skills for using equipment + Technical user manual + Report outline (table of contents) + Grouping cooperation (group introduction) + Rubrics for rating final report

Reading list	Students must pre-read the materials at home, research and study deeper through the textbooks. Handouts are updated every week. Students should conduct self-study and learn by the suggested documents. In addition, students can refer to the following textbooks/ references: Textbooks: [1]. Moaveni, S. (2016). Engineering fundamentals: An introduction to engineering (5th Edition). USA, Stamford: Cengage Learning. [2]. Kosky, P., Wise, G., Balmer, R. & Keat, W. (2020). Exploring engineering: An introduction to engineering and design (5th Edition). USA, Burlington, MA: Elsevier Inc. References: [3]. Gottfried, B. S. (2005). Spreadsheet tools for engineers using Excel (3rd Edition). USA: McGraw-Hil

Module designation	*Fluid Mechanics*
Semester(s) in which the module is taught	*3*
Person responsible for the module	*Thi-Hong-Hieu LE, Hung-Anh LY, Song-Thanh-Thao NGUYEN, Tien-Anh TRAN, Ngoc-Anh VU, Thi-Hong-Nhi VUONG.*
Language	*English/Vietnamese*
Relation to curriculum	*Compulsory, Fundamental Engineering Course*
Teaching methods	*Lecture, Practice/Tutorial/Group work, lab works* *Blended learning*
Workload (incl. contact hours, self-study hours)	*Total workload: 150 hours* *- Lecture and exercise in class: 30 hours* *- Tutorial: 18 hours* *- Labs/Practices: 12 hours* *- Self-study: 75 hours* *- Others: 15 hours*
Credit points	*3 (6 ECTS)*
Required and recommended prerequisites for joining the module	*Calculus 1, Calculus 2* *General Physics 1,General Physics 2*
Module objectives/intended learning outcomes	*The course aims at providing students with the concepts and approach to solve the practical fluid flows problems regarding static fluid and fluid dynamics of external and internal flows.* ***Intended learning outcomes*** *L.O.1 Be able to use terminology to describe the properties of fluids, the flow of motion and the problem of fluid-solid interaction* *L.O.2 Establish and apply the fundamental equations of the static fluids and the conservation of fluid flow (mass, momentum and energy)* *L.O.3 Evaluate of the role of non-dimensional quantities and the application of dynamic similiaries in fluid-solid interaction problems* *L.O.4 Communicate with the lecturer and collaborate with group members to jointly complete class discussion topics.* *L.O.5 Carry out experiments in small gorup, analyze data for statics and fluid dynamics problems*
Content	*Chapter 1: Introduction to Fluid mechanics* *Chapter 2: Fluid statics* *Chapter 3: Fluid kinematics* *Chapter 4: Conservation equations of fluid flows* *Chapter 5: Dimensional Analysis and Similarity* *Chapter 6: Flow past immersed body – Boundary-layer theory & Lift and Drag* *Labwork* *Experiment no.1: measurement of static pressure force on the flat plate* *Experiment no. 2: Investigation of meta center height* *Experiment no.3 : Flow speed measurement by Pitot tube*
Exams and assessment formats	*Short computer-based quizzes, take-home written assignments* *Lab report (3 group reports)* *Midterm assessment (60 minutes): Multiple choice Quiz and constructed response.* *Final exam (90 minutes): Multiple choice Quiz and constructed response.*

Study and examination requirements	*Students must have a final grade of 50% or higher to pass. The final grade includes:* *+ 10%: Regular exercises/group work* *+ 10%: Laboratory evaluation* *+ 30%: Mid-term exam* *+ 50%: Final exam*
Reading list	*[1] Munson and al, "Fundamentals of Fluid Mechanics", John Willey & Sons Inc, 7th Edition* *[2] Frank M. White, "Fluid Mechanics"- 4th Edition, Mc-Graw Hill.* *[3] Nakayama Y., Boucher R.F, "Introduction to Fluid Mechanics", Butterworth-Heinemann, 2000.*

Module designation	MECHANICS OF DEFORMABLE SOLIDS
Semester(s) in which the module is taught	4
Person responsible for the module	Assoc. Prof. Dr. Ly Hung Anh
Language	Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Lectures, Tutorial, Projects, Self-study
Workload (incl. contact hours, self-study hours)	Total work load (Hours): 150 Lecture: 30 hours Projects: 45 hours Self-study: 60 hours Others: 15 hours
Credit points	3 credits (ECTS: 6)
Required and recommended prerequisites for joining the module	TR2039 Engineering Mechanics
Module objectives/intended learning outcomes	Upon completion of this course, students know how to: - Apply knowledge of mathematics and physics to solve problems of calculating stress - deformation, force - displacement of structures subjected to axial tension-compression, bending, torsion. - Calculate displacement of load-bearing structures by energy method. - Evaluate structural designs and engineering solutions.

Content	The Mechanics of Deformed Solids course investigates the behavior of solid structure subjected to external forces, that is, its displacement and deformation. Week 1: Introduction to mechanics of deformable solids, initial concept, tensor, coordinate transformations Week 2: External and internal forces; stress-strain; Hooke's law; stress transformation. Week 3: Mohr's circle; Mechanical properties of material. Week 4: Tensile/compression testing; Saint-Venant's principle. Week 5, 6: Elastic deformation of an axially loaded member; Principle of superposition. The force method of analysis for axially loaded members. Week 7: Torsional deformation of a circular shaft; The torsion formula. Week 8: Determine the shear force and bending moment at a position on the beam. Week 9, 10: Shear force and Bending moment diagrams. Week 11, 12: Introduction to energy; Strain (or internal) energy, external potential energy, total energy and energy conservation.) Week 13: Castigliano's theorems - The first theorem and the second theorem. Week 14, 15: Theories of Failure.
Exams and assessment formats	- One mid-term test (60 minutes) - Assignment - Mini project (work in group and give presentation) - One final exam (90 minutes)
Study and examination requirements	Requirements for successfully passing the course: The final grade in the course is composed of 50% performance on final exams, 30% assignment/ mini project, 20% mid-term test. Students must have a final grade of 5.0/10.0 or higher to pass.
Reading list	[1] R. C. Hibberler, Mechanics of Materials, 10th Edition, Pearson Prentice Hall, 2018. [2] Lê Đình Tuân, Cơ học kết cấu dành cho cho sinh viên kỹ thuật giao thông, NXB ĐHQG Tp.HCM, 2014. [3] Nguyễn Đăng Hưng, Éléments de Mécaniques des solides déformables (Nhập môn Cơ học Vật rắn biến dạng), bản song ngữ, Trường Đại học Bách khoa - ĐHQG-HCM, 1991.

Aerodynamics 1 - Incompressible Aerodynamics **Course ID: TR2011**

Module designation	Aerodynamics 1 - Incompressible Aerodynamics - TR2011
Semester(s) in which the module is taught	4
Person responsible for the module	Dr. Le Thi Hong Hieu
Language	Vietnamese / English
Relation to curriculum	Compulsory
Teaching methods	Lectures/Tutorial/Projects
Workload (incl. contact hours, self-study hours)	Total workload: 150 hours Contact hours: - Lecture and exercise on class: 30 hours - Tutorial: 24 hours - Project: 9 hours - Self Study 72 hours - Others: 15 hours
Credit points	3 (6 ECTS)
Required and recommended prerequisites for joining the module	Fluid Mechanics - TR1005
Module objectives/intended learning outcomes	To provide students with fundamentals principles of inviscid incompressible aerodynamics in estimating the lift and drag coefficients in 2D and 3D flows over aircraft wing; to develop the ability to predict traditional aircraft performance parameters from aircraft geometry, weight, aerodynamic coefficients, altitude, and engine parameters; to develop ability in estimation and selection of aircraft parameters concerning lift- drag coefficients in preliminary aircraft design. L.O.1 - Understand the basic principles and equations of aerodynamics. L.O.2 - Calculate and analyse the aerodynamic forces and moments on the aircraft wing at low speed. L.O.3 - Cooperate with team members to complete group work in class discussions and project. L.O.4 - Have skill to search documents, to write reports and analyze the aerodynamic implication in aircraft performance and design.

Content	- Apply knowledge to analyze aerodynamic forces and moments on aircraft. - Apply the result of 1D, inviscid, incompressible conservation equations - Estimate and analyze forces and moment on the airfoil - Estimate and analyze forces and moment on the 3D wing - Analyze the viscous forces
Exams and assessment formats	Tutorial: 20% Projects: 10% Midterm Exam: constructed response, 60 minutes, 20% Final Exam: constructed response, 90 minutes, 50%
Study and examination requirements	All learning resources related to this course will be informed in the first week of the course program. Students should prepare material at home in order to participate in active learning activities (students should be the center of teaching and learning activities) such as Question & Answers, problem-based discussion in groups, etc. • Students must complete a minimum of 90% of the homework and a half of these which score must be higher than 6.5 • Major assignments must be presented in the class. The final report should be repaired according to the suggestions and comments of classmates and instructor, it must be submitted before the final exam. • There is no exception for submitting report lately unless having legitimate reasons
Reading list	[1] John D. Anderson, Jr, "Fundamentals of Aerodynamics", McGraw-Hill, 2001. [2] Houghton and Carpenter, Aerodynamics for Engineering Students, 5th Edition, Edward Arnold, 2003 (E-book). [3] McCormic, "Aerodynamics, Aeronautics and Flight Mechanics", John Wiley & Sons, 1995. [4] Aerodynamics of Flights, W. Phillips – Chapter 1-Overview of Aerodynamics (E-book). [5] MIT Open Courseware, Aerodynamics, MIT Course Number:16.100,

Engineering Mechanics **Course ID: TR2039**

Module designation	Engineering Mechanics – TR2039
Semester(s) in which the module is taught	3
Person responsible for the module	Le Dinh Tuan
Language	Vietnamese / English
Relation to curriculum	Compulsory
Teaching methods	Blended learning/Practise-based learning
Workload (incl. contact hours, self-study hours)	Total workload: 200 hours Contact hours: - Lecture and exercise on class: 45 hours - Tutorial: 24 hours - Project: 9 hours - Self Studytin: 102 hours - Others: 20 hours
Credit points	4 (8 ECTS)
Required and recommended prerequisites for joining the module	*NA*
Module objectives/intended learning outcomes	The mechanics of the rigid bodies dealing with the bodies at rest is termed as Statics and that dealing with bodies in motion is called Dynamics. The dynamics dealing with the problems without referring to the forces causing the motion of the body is termed as Kinematics and if it deals with the forces causing motion also, is called Kinetics. Mechanical vibration of a simple systems possessing masses, damping and elasticity is also mentioned with applications. The course also involve students in doing some experiments for a realistic approach.

Content	- Introduction: vector, operations with forces, moment, coplanar force systems; - Resultants of coplanar/spatial force systems; - Equilibrium of coplanar/spatial force systems; - Static / kinetic friction, coefficient of static / kinetic friction; - First moments and centroid. Kinematics: - Kinematics of a particle, velocity, acceleration; - Rectilinear motion, curvilinear motion, velocity and acceleration's rectangular / tangential and normal / radial and transverse components; - Translation and rotation of rigid body, instantaneous axis of rotation, Coriolis' law; - Absolute motion, relative motion, following motion. General motion of a particle and a rigid body. Spatial motion of rigid body. Dynamics: - Dynamics of a particle, a rigid body in translation / rotation / in plane motion; - Work and energy; - Impulse and momentum; - Mechanical vibrations: d'Alembert's principle, Lagrange's equations, free vibration of 1 dof system, forced response to a harmonic excitation, forced response to a random excitation, vibration of 2 dofs systems, applications.
Exams and assessment formats	Tutorial: 20% Projects: 10% Midterm Exam: 20% Final Exam: 50%
Study and examination requirements	Documents are posted to BKEL site weekly. Students download, print out, and bring them to class. The overall score of the subject is assessed throughout the learning process. • Tutorial: 20% • Projects: 10% • Midterm Exam: 20% • Final Exam: 50% Students are divided into groups (up to 4 students per group). Students are required to carefully read the laboratory instructions before going to the laboratory, prepare data collection tables, and have a data confirmation signature before leaving the laboratory. The report is presented as given template and printed out as hard copy.

Reading list	[1] W.G. McLean, Merle C. Potter, E. W. Nelson, Charles L. Best, Schaum s Outline of Engineering Mechanics: Statics, Schaum's Outline series, 7th Edition. McGraw-Hill Education, 2020. [2] W.G. McLean, Merle C. Potter, E. W. Nelson, Charles L. Best, Schaum s Outline of Engineering Mechanics: Dynamics, Schaum's Outline series, 7th Edition. McGraw-Hill Education, 2020. [3] William T. Thomson, Theory of Vibration with Applications, CRC Press, eBook, 2017.

Flight Mechanics **Course ID: TR3001**

Module designation	TR3001 – Flight Mechanics
Semester(s) in which the module is taught	5
Person responsible for the module	Ngo Khanh Hieu
Language	Vietnamese/English
Relation to curriculum	Compulsory
Teaching methods	- Blended learning
Workload (incl. contact hours, self-study hours)	Total workload: 150 hours - Lecture and exercise on class: 30 hours - Tutorial: 24 hours - Project: 9 hours - Self Study 72 hours - Others: 15 hours
Credit points	3
Required and recommended prerequisites for joining the module	Required: None Recommended: Aerodynamics 1 (TR2011)
Module objectives/intended learning outcomes	This course provides the basic concepts of the aircraft performance in order to estimate and/or to verify the aircraft's performance characteristics, and also the suitable configuration design options of a fixed-wing aircraft. This course aims students to satisfy the 05 following learning outcomes: L.O.1 – Establish the principles of flight mechanics and aircraft basic equations of motion L.O.2 – Determine and evaluate the aircraft flight performance at different flight conditions L.O.3 – Estimate and evaluate the aircraft static stability L.O.4 – Explain the suitability of endurance, flight time, speed… of an aircraft at the request of the operator L.O.5 – Collaborate with group members to jointly complete class discussion topics and projects
Content	- Chapter 1: Introduction to course. - Chapter 2: How an airplane can fly? - Chapter 3: Aerodynamics of a fixed-wing aircraft - Chapter 4: Propulsion systems of a fixed-wing aircraft

	- Chapter 5: Aircraft performance in steady flight of a fixed-wing aircraft - Chapter 6: Aircraft performance in accelerated flight of a fixed-wing aircraft - Chapter 7: Take-off and landing of a fixed-wing aircraft - Chapter 8: Introduction to aircraft stability of a fixed-wing aircraft - Chapter 9: Analysis of the static stability of a fixed-wing aircraft - Chapter 10: Analysis of the aircraft configuration design options of a fixed-wing aircraft.
Exams and assessment formats	The final score is evaluated throughout the study process as follows. - Exercises: 20% - Projects: 10% - Mid-term exam: constructed response, 60 minutes, 20% - Final exam: constructed response, 90 minutes, 50%
Study and examination requirements	Learning Strategies - Students should ensure a sufficient participating-time in class - Students should do diligently the homework exercises - Students should promote group working and share experiences among group participants Course requirement: - Students must complete a minimum of 90% of homework and 50% of these must have a score higher than 6.5 - Major assignments must be submitted before the final exam.
Reading list	Main textbooks: [1] Jan Roskam, Chuan-Tau Edward Lan, "Airplane Aerodynamics and Performance", revised edition, DARcorporation, 2016. [2] Stephen Corda, "Introduction to Aerospace Engineering with a Flight Test Perspective", John Wiley & Sons, Inc., 1st edition, 2017. Reference documents: [1] Ashish Tewari, "Basic Flight Mechanics", Springer International Publishing Switzerland, 2016. [2] Maido Saarlas, "Aircraft Performance". John Wiley & Sons, Inc., 2007.

Module designation	MECHANICS OF AIRCRAFT MATERIALS
Semester(s) in which the module is taught	7, 8
Person responsible for the module	Assoc. Prof. Dr. Ly Hung Anh
Language	Vietnamese
Relation to curriculum	Elective
Teaching methods	Lectures, Tutorial, Projects, Self-study
Workload (incl. contact hours, self-study hours)	Total work load (Hours): 150 hours Lecture: 30 hours Projects: 45 hours Self-study: 60 hours Others: 15 hours
Credit points	3 credits (ECTS: 6)
Required and recommended prerequisites for joining the module	Recommended: MT1003: Calculus 1 MT1005: Calculus 2 PH1003: General Physics 1 PH1005: General Physics 2
Module objectives/intended learning outcomes	Upon completion of this course, students know how to:
Content	Objectives of this course is providing fundamental knowledge in analyzing the behavior of different aerospace materials, especially composite materials: Mechanical properties and applications of metallic materials, non-metallic; The theory basis of the composite material structure at the level of micro and macro; Phenomenon and mechanism of composite material damage, destruction standards; Methods of stress analysis and deformation of layered composite materials. Week 1: General Introduction of Materials. Week 2: Mechanical properties of metallic materials used in aircraft manufacturing. Week3: Mechanical properties of composite and non-metallic materials used in aircraft manufacturing. Week4: General knowledge of composite materials: classification and methods of production. Week 5: Fabricating a composite flat sheet (30 x 30 cm), glass - Epoxy. Week 6, 7: Analysis and calculation of mechanical properties at the micro level of a lamina Week 8, 9, 10: Analysis and calculation of mechanical properties at the macro level of a lamina. Week 11, 12: Mechanical properties at the macro level of a plate.. Week 13, 14: Strength failure theories of laminates. Week 15: Evaluation for student reports; Discussion for final examination.
Exams and assessment formats	- One mid-term test (60 minutes) - Assignment - Project - One final exam (90 minutes)

Study and examination requirements	Requirements for successfully passing the course: The final grade in the course is composed of 50% performance on final exams, 20% assignment, 10% project, 20% mid-term test. Students must have a final grade of 5.0/10.0 or higher to pass.
Reading list	[1] Ronald F. Gibson, Principles of Composite Material Mechanics (Mechanical Engineering), CRC Press, 4th Edition, 2016. [2] Autar K. Kaw, Mechanics of composite materials, CRC Press, 2nd Edition, 2006. [3] Bruce K. Donaldson, Analysis of aircraft structures, Cambridge University Press, 2nd Edition, 2008.

Aerodynamics 2 - Compressible Aerodynamics **Course ID: TR3011**

Module designation	Aerodynamics 2 - Compressible Aerodynamics - TR3011
Semester(s) in which the module is taught	6
Person responsible for the module	Dr. Vuong Thi Hong Nhi
Language	Vietnamese / English
Relation to curriculum	Compulsory
Teaching methods	Lectures/Tutorial/Projects
Workload (incl. contact hours, self-study hours)	Total workload: 150 hours Contact hours: - Lecture and exercise on class: 30 hours - Tutorial: 24 hours - Project: 9 hours - Self Study 72 hours - Others: 15 hours
Credit points	3 (ECTS: 6)
Required and recommended prerequisites for joining the module	Incompressible Aerodynamics – TR2011
Module objectives/intended learning outcomes	To provide students with fundamentals principles of one-dimensional inviscid incompressible aerodynamics in order to estimate the lift and drag coefficients of airplane wings in supersonic flows. Calculation of supersonic flow properties across the normal shock, oblique shock, and expansion waves. Compressibility corrections from incompressible pressure distributions to obtain critical Mach number in aircraft performance. To understand the theory and to be able to design an ideal nozzle contour.
Content	- Apply knowledge to analyze the aerodynamic forces and moments in high-speed flight. - Understand the principles and flow conservation equations for compressible flows. Chapter 2: normal shock - Apply the fundamental theory of inviscid and compressible flows. Chapter 3: oblique shock and expansion fans - Estimate and evaluate aerodynamic forces and moments on the supersonic wing. - Supersonic flows over airfoil and wing. - Internal compressible flows in nozzle, diffuser, and wind tunnel. - Realize 'work-ready engineer' and benefits of aerodynamics application in analyzing airplane performance characteristics and design.
Exams and assessment formats	Tutorial: 20% Projects: 10% Midterm Exam: 20% Final Exam: 50%

Study and examination requirements	All learning resources related to this course will be informed in the first week of the course program. Students should prepare material at home in order to participate in active learning activities (students should be the center of teaching and learning activities) such as Question & Answers, problem-based discussion in the group, etc. The final grade will be as follows: • Midterm exam: 20% of the final grade • Major assignment: 20% of the final grade • Group Projects: 10% • Final Exam: 50%
Reading list	[1] John D. Anderson, Fundamental of Aerodynamics, 3rd Edition, McGraw-Hill, 2003. [2] John D. Anderson, Modern Compressible Flow with Historical Perspectives, 3rd Edition, McGraw-Hill, 2003. [3] Stephen A. Whitmore, PhD-Asst. Prof. MAE Dept, Course Notes - MAE 5420 - Compressible Fluid Flow – UtahState University.

Wind turbines Course ID: TR3029

Module designation	WIND TURBINES
Semester(s) in which the module is taught	6, 7, 8
Person responsible for the module	Dr. Tran Tien Anh
Language	Vietnamese, English
Relation to curriculum	Elective subject
Teaching methods	Lectures, Tutorial, Projects, Self-study
Workload (incl. contact hours, self-study hours)	Total work load (hours): 124.67 -Lectures: 30 -Tutorial/ Exercise: 12 -Projects: 27 -Self-study: 93
Credit points	3 credits (ECTS: 4)
Required and recommended prerequisites for joining the module	None
Module objectives/ intended learning outcomes	By the end of this course students will be able to: + Apply knowledge of fluid mechanics and gas + Apply of aerodynamics knowledge + Ability to apply knowledge of mathematics, principles of conservation to build the mathematical model for wind turbines + Ability to analyze computational aerodynamics applied to wind turbine + Ability to analyze and compute forces applied to blades + Ability to calculate the design, sizing of parameters characteristic of wind turbines for a required system in practice.

Content	This subject present characteristics of wind turbine, operating principles and design methods of wind turbine components. Characteristics of wind turbines: power, efficiency, rpm Wind turbine classification: wind pump, electric wind turbine, vertical and horizontal wind turbines. Methods for designing wind turbine components: + Aerodynamic rotor + Guidance system + Power adjustment system, rpm adjustment system + Tower Economic aspect of onshore and offshore wind turbines. Envicromental influences of wind turbines and noise reduction. Week 1: General introduction Week 2: Wind: Origin and local influence Week 3: Components of a wind energy converter Week 4: The basics of wind energy conversion Week 5: Analysis of wind modes Week 6: Wind energy conversion systems Week 7: Design considerations Week 8: Horizontal axis wind turbine Week 9: Features of wind energy conversion systems Week 10: Operation and control of wind energy converters Week 11: Loading due to waves on offshore wind turbine in deep and shallow water Week 12: Wind energy and the environment Week 13: Wind turbine noise making mechanism Week 14: Measures to reduce noise Week 15: Economic issues of wind energy
Exams and assessment formats	- Multiple choice quizzes - Group homeworks - Assignment - One final exam (90 minutes)
Study and examination requirements	Requirements for successfully passing the course: The final grade in the course is composed of - 20% group homeworks, - 30% Mid-term test - 50% assignment, - 0% performance on final exams, Students must have a final grade of 5.0/ 10.0 or higher to pass.

Reading list	**Textbooks:** [1]. Mathew, S. & Philip, G. S. (2011). *Advances in wind energy conversion technology*. Heidelberg, Berlin: Springer-Verlag. [2]. Wu, B., Lang, Y., Zargari, N. & Kouro, S. (2011). *Power conversion and control of wind energy systems*. Hoboken, New Jersey: John Wiley & Sons, Inc. [3]. Wagner, H. J. & Mathur, J. (2009). *Introduction to wind energy systems- Basics, technology and operation*. Heidelberg, Berlin: Springer-Verlag. **References:** [4]. Stankovic, S., Campbell, N. & HarrieS, A. (2009). *Urban wind energy*. Sterling, VA, USA: Earthscan. [5]. Mathew, S. (2006). *Wind energy- Fundamentals, resource analysis and economics*. Heidelberg, Berlin: Springer-Verlag. [6]. Köller, J., Köppel, J., & Peters, W. (2006). *Offshore wind energy- Research on environmental impacts*. Heidelberg, Berlin: Springer-Verlag. [7]. Sorensen, B. (2004). *Renewable energy- Its physics, engineering, use, environmental impacts, economy and planning aspects* (3rd Edition). New York, USA: Elsevier Science. [8]. Manwell, J. F., McGowan, J. G., & Rogers, A. L. (2002). *Wind energy explained- Theory, design and application*. Chichester, West Sussex, England: John Wiley & Sons Ltd. [9]. Burton, T., Sharpe, D., Jenkins, N., & Bossanyi, E. (2001). *Wind energy handbook*. West Sussex, England: John Wiley & Sons, Ltd. [10]. Wagner, S., Bareu, R., & Guidati, G. (1996). *Wind turbine noise*. Heidelberg, Berlin: Springer-Verlag.

Module designation	TR3039 – Aircraft Stability and Control
Semester(s) in which the module is taught	6, 7
Person responsible for the module	Ngo Khanh Hieu
Language	Vietnamese/English
Relation to curriculum	Compulsory
Teaching methods	- Blended learning
Workload (incl. contact hours, self-study hours)	Total workload: 150 hours - Lecture and exercise on class: 30 hours - Tutorial: 24 hours - Project: 9 hours - Self Study 72 hours - Others: 15 hours
Credit points	3
Required and recommended prerequisites for joining the module	Required: None Recommended: TR2011: Aerodynamics 1 - Incompressible Aerodynamics TR3001: Flight Mechanics
Module objectives/intended learning outcomes	The objective of this course is to provide the basic concepts of the aircraft stability and control in order to develop and/or to verify the aircraft's stability-control characteristics, and also the automatic control/auto-pilot mode. This course aims students to satisfy the 04 following learning outcomes: L.O.1 – Apply knowledge to explain problems related to the static stability of an aircraft L.O.2 – Determine the dynamic stability charactetistics of the aircraft according to its design parameters L.O.3 – Apply knowledge to interpret aircraft operations and performance under flight control settings L.O.4 – Set-up classic automatic flight control for aircraft based on required flight performance

Content	- Chapter 1: Introduction to course, review on flight mechanics. - Chapter 2: Nomenclature used in describing a fixed-wing aircraft stability and control - Chapter 3: Static stability of a fixed-wing aircraft - Chapter 4: Orientation and position of an aircraft - Chapter 5: Aerodynamic force and moment derivatives due to the motion of a fixed-wing aircraft - Chapter 6: Longitudinal motion of a fixed-wing aircraft - Chapter 7: Lateral motion of a fixed-wing aircraft - Chapter 8: Fixed-wing aircraft response to control - Chapter 9: Control theory to aircraft auto-pilot
Exams and assessment formats	The final score is evaluated throughout the study process as follows. - Exercises: 20% - Projects: 10% - Mid-term exam: constructed response, 60 minutes, 20% - Final exam: constructed response, 90 minutes, 50%
Study and examination requirements	Learning Strategies - Students should ensure a sufficient participating-time in class - Students should do diligently the homework exercises - Students should promote group working and share experiences among group participants Course requirement: - Students must complete a minimum of 90% of homework and 50% of these must have a score higher than 6.5 - Major assignments must be submitted before the final exam.
Reading list	Textbooks: [1] Bandu N. Pamadi, “Performance, Stability, Dynamics, and Control of Airplanes”, Third edition, AIAA, 2015. [2] Robert F. Stengel, “Flight Dynamics”, Princeton University Press, 2nd edition, 2022. Reference books: [1] Wayne Durham, "Aircraft Flight Dynamics and Control", John Wiley & Sons, Inc., 1st edition, 2013. [2] Robert C. Nelson, "Flight Stability and Automatic Control", McGraw-Hill, 2nd edition, 1998.

Module designation	Aerospace Engineering Lab 2
Semester(s) in which the module is taught	6
Person responsible for the module	Msc. Dang Trung Duan
Language	English - Vietnamese
Relation to curriculum	
Teaching methods	Blended learning Practise-based learning
Workload (incl. contact hours, self-study hours)	Total: 50 hours - Labs/Practices: 30 hours - Self-study: 15 hours - Others: 15 hours
Credit points	3 credits (2 ETCS)
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	Aerospace Engineering Lab 2 provides students with practice and knowledge in the following subjects: wing profile and basis theories to calculate the thrust, calculation the drag and evaluation the factors affecting the drag, hydraulic system, centrifugal fan, truss structure, mechanical properties of materials. L.O.1 - Strictly comply with laboratory rules, operating procedures as well as regulations on labor safety. L.O.2 - Develop team work skill by sharing work load and active contribution L.O.3 - Understand the parameters and characteristics of the device as well as the experimental procedure. L.O.4 - Analyze experimental data and explain phenomena based on fundamental knowledge. L.O.5 - Compare the obtained data with different reliable data sources of draw appropriate comments and conclusions.

Content	Lesson 1: Introduction and course's outline Contents/Experiments • Guidelines • Evaluation method. • Schedule • Lecture process • Self study at home Communication method with instructor. Lesson 2: Observation of flow over bodies (cylinder, sphere, airfoil..) Lesson 3: Measurement of lift/drag on nonstreamline bodies: sphere, semi-sphere, plate, teardrop shape Lesson 4: Hydraulic system Experiment 4.1 - Double acting hydraulic cylinder Experiment 4.2 - Flow control valve Lesson 5: Investigation of centrifugal fan Experiment 5.1 - Define characteristic line of the system. Experiment 5.2 — Change the impeller Lesson 6: Determine the bending strain of truss structure Lesson 7: Investigate mechanical properties of materials Lesson 8: Measurement of propeller geometry and estimation of its thrust
Exams and assessment formats	+ Labs/Practices: 30% + Experimental reports: 70%
Study and examination requirements	+ Students must present at least 5 minutes before the starting time of class. The group with students who are late will not be allowed to take the experiment and receives a score of 0 for that lab lesson. + Students read the content of the lab lesson, experimental steps, the equipment operations and prepare the table to record the experimental data. + Students must bring smartphones or laptops to do the quiz at the beginning of each lab lesson on Bkel. The group of students with a Quiz score <70% will not be allowed to do the experiment and receives a score of 0 for that lab lesson. + Students do experiments, process data and complete report files before lab lesson end and submit reports according to the link on Bkel at the end of each lab lesson. Therefore, each group has a laptop ready to complete the report right in class. The group that does not complete the report on time will be deducted 2 points on lesson score. + Students submit hard copies of their reports before one week after lab lesson ended. + To be able to gather knowledge, and get learning outcomes, students are required to regularly attend course sessions. If there is no reason for not attending the class more than 2 times, the student is not eligible to evaluate the subject results
Reading list	Aerospace Engineering Document

Real-Time or Embedded Systems **Course ID: TR3055**

Module designation	TR3055 – Real-Time or Embedded Systems
Semester(s) in which the module is taught	7, 8
Person responsible for the module	Ngo Khanh Hieu
Language	Vietnamese/English
Relation to curriculum	Elective
Teaching methods	- Blended learning
Workload (incl. contact hours, self-study hours)	Total workload: 150 hours - Lecture and exercise on class: 30 hours - Project: 45 hours - Self Study 60 hours - Others: 15 hours
Credit points	3
Required and recommended prerequisites for joining the module	Required: None Recommended: None
Module objectives/intended learning outcomes	To provide students the fundamental and advanced concepts of the "timing constraints in real-time systems". This course aims students to satisfy the 04 following learning outcomes: L.O.1 – Understand the common concepts, terminologies and demonstrate operating principles in the real-time or embedded control system. L.O.2 – Discuss the principles and analyze the real-time scheduling of tasks in the multiprocessor systems with the centralized control. L.O.3 – Present and analyze the principles of real-time standard and real-time programming languages. L.O.4 – Present group project about the design or analysis of the real-time or embedded control system.
Content	- Chapter 1: Introduction to the course - Chapter 2: Real-time or embedded system characteristics - Chapter 3: Hardware/Software structures in real-time or embedded systems - Chapter 4: Functional model-based structures of real-time or embedded systems

	- Chapter 5: Object-oriented model-based structures of real-time or embedded systems - Chapter 6: Model-based systems for a real-time or embedded system in real world - Chapter 7: Tools for modelling and peformance analysis of real-time or embedded systems - Chapter 8: Monoprocessor real-time scheduling - Chapter 9: Multiprocessor real-time scheduling - Chapter 10: Real-time programming languages
Exams and assessment formats	The final score is evaluated throughout the study process as follows. - Exercises: 10% - Projects: 30% - Mid-term exam: constructed response, 60 minutes, 20% - Final exam: constructed response, 90 minutes, 40%
Study and examination requirements	Learning Strategies - Students should ensure a sufficient participating-time in class - Students should do diligently the homework exercises - Students should promote group working and share experiences among group participants Course requirement: - Students must complete a minimum of 90% of homework and 50% of these must have a score higher than 6.5 - Major assignments must be submitted before the final exam.
Reading list	Main textbooks: [1] Hassan Gomaa, "Real-Time Software Design for Embedded Systems", Cambridge University Press, 1st edition, 2016 [2] C.M. Krishna, K.G. Shin, "Real-Time Systems", McGraw Hill Education, 1st edition, 2017 Reference documents: [1] Phillip A. Laplante, "Real-Time Systems Design and Analysis", John Wiley & Sons, Inc., 4th edition, 2012. [2] Francis Cottet, "Scheduling in Real-Time Systems", John Wiley & Sons, Inc., 2002.

Module designation	**Control-Command Systems: Analysis and Design**
Semester(s) in which the module is taught	7, 8
Person responsible for the module	Assoc. Prof. Dr. Ngô Khánh Hiếu
Language	English - Vietnamese
Relation to curriculum	Elective
Teaching methods	Lectures, Tutorial, Projects, Self-study
Workload (incl. contact hours, self-study hours)	Total workload: 150 hours - Lecture and exercise on class: 30 hours - Project: 45 hours - Self Study 60 hours - Others: 15 hours
Credit points	3 credits (6 ETCS)
Required and recommended prerequisites for joining the module	Recommended: Electrical and Electronics Engineering (EE2011)
Module objectives/intended learning outcomes	The course provides knowledge about control systems, analysis and design control system methods . Besides, the course also helps students get acquainted with professional control system design software. Intended learning outcomes - Demonstrate terminologies and common concepts of a control-command system Demonstrate terminologies and common concepts of a control-command system. - Present concepts, functions and links between the control-command development life-cycle. - Discuss the functional approaches for the analysis and design of the control-command systems. - Discuss the object-oriented approaches for the analysis and design of the control-command systems. - Discuss the principles and the use of the analsys and design's simulation in control-command systems.

Content	This course provides the basic concepts of the control-command systems: how to categorize the control-command systems, the fundamental characteristics of a such system,… This course is also consisting of the current approaches for the analysis and the design of the control-command systems, including some softwares and some graphical programming languages (typically LabVIEW, MatLab/Simulink) that we could use for the tests and for the simulation of a control-command system. Week 1: Introduction about the course - Teacher's information - Course - related issues. - Methods of teaching and learning. - Recalling the knowledge of control systems learned in the subject "Electrical - Electronic Engineering". Week 2: Master the technical terms, concepts and principles of a control system - Concept - Basic features - Classification of control systems. Week 3: Presenting concepts and principles of analysis - designing control systems methods to meet functional requirements - The role of the hardware/software development cycle. - Characteristic of the classic development cycle. - Features of the classic co-design development cycle. Week 4: Presentation of the concepts and principles of analysis - design control systems methods to meet functional requirements - Features of the functional method - SA-RT method Week 5: Presentations of the concepts and principles of analysis - designing control systems methods to meet functional requirements - Overview - DARTS method Week 6: Presentations of the concepts and principles of object-oriented control system design and analysis methods - Features of object-oriented methods - CODARTS method. Week 7: Presentations of the concepts and principles of object-oriented control system design and analysis methods - Overview - CODART method. Week 8: Presentations of the concepts and principles of object-oriented control system design and analysis methods - Overview - AADL method. Week 9: Presentations of the principles and applications of simulation, analysis and design control system software - Overview. - LabVIEW Guide.

	Week 10: Presentations of the principles and applications of simulation, analysis and design control system software - Overview. - LabVIEW app. Week 11: Presentations of the principles and applications of simulation, analysis and design control system software - Overview. - MatLab/Simulink tutorial. Week 12: Presentations of the principles and applications of simulation, analysis and design control system software - Overview. - MatLab/Simulink application. Week 13: Presentations of the principles and applications of simulation, analysis and design control system software - Overview. - AADL tool guide. Week 14: Presentations of the principles and applications of simulation, analysis and design control system software - Overview. Week 15: Course reviews
Exams and assessment formats	- One mid-term test (60 minutes) - Assignment - Project One final exam (90 minutes)
Study and examination requirements	Requirements for successfully passing the course: The final grade in the course is composed of 40% performance on final exams, 10% assignment, 30% project, 20% mid-term test. Students must have a final grade of 5.0/10.0 or higher to pass.
Reading list	[1] Francis Cottet, Emmanuel Grolleau, Systèmes Temps Réel de Contrôle-Commande, Dunod, 2005. [2] Hassan Gomaa, Software Design Methods for Concurrent and Real-Time Systems, Addison Wesley, SEI Series in Software Engineering, 1993. [3] Peter H. Feiler, David P. Gluch, Model-Based Engineering with AADL, Addison-Wesley, 2013. [4] M. Rivoire, J.-L. Ferrier, MatLab Simulink Stateflow avec des exercises d'automatique résolus, Editions Technip, 2001. [5] Francis Cottet, LabVIEW, Programmation et Applications, Dunod, 2001.

Module designation	**Aerospace Engineering Lab 1**
Semester(s) in which the module is taught	semester 6
Person responsible for the module	Msc. Dang Trung Duan
Language	English - Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Blended learning Practise-based learning
Workload (incl. contact hours, self-study hours)	Total: 50 hours - Labs/Practices: 30 hours - Self-study: 15 hours - Others: 15 hours
Credit points	1 credits (2 ETCS)
Required and recommended prerequisites for joining the module	Recommended TR1005: Fluid Mechanics
Module objectives/intended learning outcomes	Aerospace Engineering Lab 1 provides students with practice and knowledge in the following subjects: measurement of wind speed by pitot tube, investigation of flame stability and propagation, performance characteristics of gear pump and centrifugal fan. L.O.1 - Strictly comply with laboratory rules, operating procedures as well as regulations on labor safety. L.O.2 - Develop team work skill by sharing work load and active contribution L.O.3 - Understand the parameters and characteristics of the device as well as the experimental procedure. L.O.4 - Analyze experimental data and explain phenomena based on fundamental knowledge. L.O.5 - Compare the obtained data with different reliable data sources o draw appropriate comments and conclusions.

Content	Lesson 1: Introduce course's objectives - Lecturer s profile - Learning strategies - Present experiment report Lesson 2: Burning process Exercise 1: Survey the stability of the flame Exercise 2: Survey the spread of flame Lesson 3: Survey the characteristic of centrifugal fan Exercise 1: Centrifugal fan characteristics: Pressure-flow relationship. Exercise 2: Survey dynamic similarity of centrifugal fans. Lesson 4: Hydraulic system Exercise 1: Survey flow — pressure characteristic of gear pump Exercise 2: Pressure relief valve Lesson 5: Measure the velocity with a Pitot tube Lesson 6: Measure hydrostatic force on flat plane
Exams and assessment formats	+ Labs/Practices: 30% + Experimental reports: 70%
Study and examination requirements	+ Students must present at least 5 minutes before the starting time of class. The group with students who are late will not be allowed to take the experiment and receives a score of 0 for that lab lesson. + Students read the content of the lab lesson, experimental steps, the equipment operations and prepare the table to record the experimental data. + Students must bring smartphones or laptops to do the quiz at the beginning of each lab lesson on Bkel. The group of students with a Quiz score <70% will not be allowed to do the experiment and receives a score of 0 for that lab lesson. + Students do experiments, process data and complete report files before lab lesson end and submit reports according to the link on Bkel at the end of each lab lesson. Therefore, each group has a laptop ready to complete the report right in class. The group that does not complete the report on time will be deducted 2 points on lesson score. + Students submit hard copies of their reports before one week after lab lesson ended. + To be able to gather knowledge, and get learning outcomes, students are required to regularly attend course sessions. If there is no reason for not attending the class more than 2 times, the student is not eligible to evaluate the subject results
Reading list	Aerospace Engineering Document

Module designation	FLUID MACHINERY
Semester(s) in which the module is taught	6, 7, 8
Person responsible for the module	Dr. Tran Tien Anh
Language	Vietnamese, English
Relation to curriculum	Elective subject
Teaching methods	Lectures, Tutorial, Projects, Self-study
Workload (incl. contact hours, self-study hours)	Total work load (hours): 125.5 -Lectures: 30 -Tutorial/ Exercise: 12 -Projects: 27 -Self-study: 93
Credit points	3 credits (ECTS: 4)
Required and recommended prerequisites for joining the module	None
Module objectives/ intended learning outcomes	After completing the course the student will be able to: + give examples of the main applications of turbomachines. + recognize typical designs of turbomachines. + explain the working principles of turbomachines and apply it to various types of machines. + determine the velocity triangles in turbomachinery stages operating at design and off-design conditions. + apply the affinity laws to pumps such as to determine their off-design behavior. + match a pump to a system and discuss various solutions of pump matching from a sustainability point-of-view. + perform the preliminary design of turbomachines (pumps, compressors, turbines) on a 1-d basis. + use design parameters for characterizing turbomachinery stages. + determine the off-design behavior of compressors and relate it to changes in the velocity triangles. + explain and understand how the flow varies downstream of a turbomachinery blade row. + recognize relations between choices made early in the turbomachinery design process and the final components and operability. + explain the limits of safe operation of compressors. + recognize and discuss today's and tomorrow's use of turbomachines for enabling a sustainable society.

Content	This course presents apllications of thermodynamics and fluid mechanics in researching fluid machinery. Fluid machinery presented includes pump, fan, centrifugal and axial compressor… Rotodynamic pumps which move the fluid by dynamic action of imparting momentum to the fluid using mechanical energy. Some volumetric hydraulic machines investigated include piston pumps and compressors, vane pumps, axial piston-rotor pumps, radial piston-rotor pumps... The course also presents some hydraulic machines used in airplanes, cars and ships. Reciprocating pumps which first trap the liquid in a cylinder by suction and then push the liquid against pressure. Rotary positive displacement pumps which also trap the liquid in a volume and push the same out against pressure. A basic knowledge of thermodynamics, fluid dynamics, and heat transfer is assumed. This course introduces the basic principles to the study of hydraulic pumps, centrifugal compressors and fans, axial flow compressors and fans... A brief discussion of cavitation in hydraulic machinery is also presented. Week 1: Basic concepts of turbo-machines Week 2: Dimensional and model analysis Week 3: Dimensional and model analysis (continued) Week 4: General concepts of turbomachinery Week 5: Centrifugal pumps Week 6: Centrifugal pumps (continued) Week 7: Axial flow pumps Week 8: Compressible flow- Fundamentals of compressors Week 9: Centrifugal compressors Week 10: Centrifugal compressors (continued) Week 11: Axial flow compressors & fan Week 12: Axial flow compressors & fan (continued) Week 13: Positive displacement fluid machinery Week 14: Positive displacement fluid machinery (continued) Week 15: Positive displacement fluid machinery (continued)
Exams and assessment formats	- Multiple choice quizzes - Group homeworks - Assignment - One final exam (90 minutes)
Study and examination requirements	Requirements for successfully passing the course: The final grade in the course is composed of - 15% Multiple choice quizzes. - 15% group homeworks, - 15% assignment, - 55% performance on final exams, Students must have a final grade of 5.0/ 10.0 or higher to pass.

Reading list	**Textbooks:** [1]. Mahesh Kumar (2019). *Fluid mechanics and hydraulic machines*. India, Tamil Nadu: Pearson India Education Services Pvt. Ltd. [2]. Dixon, S. L. & Hall, C. A. (2014). *Fluid mechanics and thermodynamics of turbomachinery* (7th edition). Oxford, UK: Elsevier Inc. [3]. Korpela, S. A. (2011). *Principles of turbomachinery*. Hoboken, New Jersey: John Wiley & Sons, Inc. **References:** [4]. Subramanya, K. (2011). *Fluid mechanics and hydraulic machines*. New Delhi, India: Tata McGraw Hill Education Private Limited. [5]. Husain, Z., Abdullah, Z. & Alimuddin, Z. (2008). *Basic fluid mechanics and hydraulic machines*. Sultan Bazar, Hyderabad, India: BS Publications. [6]. Gorla, R. S. R. & Khan, A. A. (2003). *Turbomachinery- Design and theory*. New York, NY: Marcel Dekker, Inc. [7]. Arasu, A.V. (2001). *Turbomachines*. New Delhi, India: Vikas Publishing House Pvt Ltd.

Module designation	**AEROELASTICITY**
Semester(s) in which the module is taught	6, 7, 8
Person responsible for the module	Dr. Tran Tien Anh
Language	Vietnamese, English
Relation to curriculum	Elective subject
Teaching methods	Lectures, Tutorial, Projects, Self-study
Workload (incl. contact hours, self-study hours)	Total work load (hours): 124.67 -Lectures: 30 -Tutorial/ Exercise: 12 -Projects: 27 -Self-study: 93
Credit points	3 credits (ECTS: 4.5)
Required and recommended prerequisites for joining the module	None
Module objectives/ intended learning outcomes	By the end of this course students will be able to: + evaluate the concepts of wing elastic axis, inertial axis and aerodynamic center, and demonstrate how the relative positioning of these axes may affect the structural-dynamic/ aeroelastic stability of the wing; + calculate the divergence speed of lifting surfaces; + apply Lagrange's method and the principle of virtual displacement to generate the equations of motion of multi degree of freedom (MDOF) aircraft structures, including wing/ control surface combinations; + apply assumed modes to generate binary and ternary structural-dynamic approximations of flexible aircraft; + calculate the modes of simple aircraft models and explain the utility of modal analysis in structural dynamics and aeroelasticity; + calculate the flutter speed of lifting surfaces using an unsteady aerodynamic model; + describe the different structural/ aerodynamic parameters which affect divergence and flutter; + demonstrate a basic understanding of modern numerical methods and the state-of-the-art in structural dynamics and aeroelasticity.

Content	This course demonstrates interaction among aerodynamic, elastic and inertial forces for any slender structures, especially for aircraft wings, blades of helicopter propellers and wind turbine blades: typical section model of an airfoil, divergence of airfoil, reversal and rolling effectiveness, wing fluttering problems, blade bending and torsion... Aeroelasticity is the study of effects of aerodynamic forces on elastic bodies, i.e. fluid-structure interactions. Analysis of stability, or more importantly instability, of objects immersed in a moving fluid is the main focus of the course. The course structure is mainly divided into two parts namely static and dynamic aeroelastic stability analysis. Static aeroelasticity deals with the divergence of a lifting surface and aircraft control reversal. Dynamic aeroelasticity involves buffeting, flutter of a wing and oscillating airfoils. Unsteady aerodynamics and dynamic stall also play a part during the flutter. Students shall learn the concept of modal analysis, various methods of structural dynamics analysis of simple beam structures and simplified analysis of aeroelastic phenomena such as divergence, control-surface reversal, and flutter. In addition, students also learn the importance of incorporating aeroelastic phenomena in aircraft design and some elementary methods for doing so. Week 1: Fundamental knowledge Week 2: Unswept wing static aeroelasticity Week 3: Unswept wing static aeroelasticity (continued) Week 4: Unswept wing static aeroelasticity (continued) Week 5: Unswept wing static aeroelasticity (continued) Week 6: Swept wing static aeroelasticity Week 7: Swept wing static aeroelasticity (continued) Week 8: Vibration and flutter Week 9: Vibration and flutter (continued) Week 10: Vibration and flutter (continued) Week 11: Vibration and flutter (continued) Week 12: Methods for flutter prediction Week 13: Methods for flutter prediction (continued) Week 14: Methods for flutter prediction (continued) Week 15: Methods for flutter prediction (continued)
Exams and assessment formats	- Multiple choice quizzes - Group homeworks - Assignment - One final exam (90 minutes)

Study and examination requirements	Requirements for successfully passing the course: The final grade in the course is composed of - 15% Multiple choice quizzes. - 15% group homeworks, - 15% assignment, - 55% performance on final exams, Students must have a final grade of 5.0/ 10.0 or higher to pass.
Reading list	**Textbooks:** [1]. Wright, J. R. & Cooper, J. E. (2015). *Introduction to aircraft aeroelasticity and loads* (2nd edition). England, West Sussex: John Wiley & Sons Ltd. [2]. Dowell, E. H. (2015). *A modern course in aeroelasticity* (5th edition). Switzerland: Springer International Publishing. [3]. Hodges, D. H. & Pierce, G. A. (2011). *Introduction to structural dynamics and aeroelasticity* (2nd edition). New York, NY: Cambridge University Press. **References:** [4]. Bisplinghoff, R. L., Ashley, H. & Halfman, R. L. (1996). *Aeroelasticity*. USA, New York: Dover Publications, Inc. [5]. Megson, T. H. G. (2014). *Introduction to aircraft structural analysis* (2nd Edition). USA, MA: Elsevier Ltd.

Module designation	TR3135 - Aircraft Structures Analysis
Semester(s) in which the module is taught	6
Person responsible for the module	Nguyen Song Thanh Thao
Language	Vietnamese/English
Relation to curriculum	Compulsory
Teaching methods	- Blended learning
Workload (incl. contact hours, self-study hours)	Total workload: 150 hours - Lecture and exercise on class: 30 hours - Tutorial: 24 hours - Project: 9 hours - Self Study 72 hours - Others: 15 hours
Credit points	3 (6 ECTS)
Required and recommended prerequisites for joining the module	Required: None Recommended: Mechanics of Deformable Solids (TR2005)
Module objectives/intended learning outcomes	To provide students the key knowledge relevant to the structures and materials in aircraft; to provide students with tools of stress analysis to formulate and solve engineering problems in aircraft structures. Students can design in detail of a specific wing structure. L.O.1 - Apply scientific and technical knowledge to solve technical problems in Aerospace Engineering L.O.2 - Perform a preliminary design for a functional system, or for a small-scaled aircraft L.O.3 - Design of a part, assembly, component, system or process on small-scaled airplanes L.O.4 - Able to solve the aircraft structural problems in group

Content	- Chapter 1: Review of Elasticity and Mechanics of materials - Chapter 2: Review of energy methods - Chapter 3: Characteristics of Aircraft Structures and Materials - Chapter 4: Thin plate theory - Chapter 5: Bending, shear and torsion of thin-walled beams - Chapter 6: Stress analysis of aircraft components
Exams and assessment formats	The final score is evaluated throughout the study process as follows. - Exercises: 20% - Projects: 10% - Mid-term exam: constructed response, 60 minutes, 20% - Final exam: constructed response, 60 minutes, 50%
Study and examination requirements	Learning Strategies - Students should ensure a sufficient participating-time in class - Students should do diligently the homework exercises - Students should promote group working and share experiences among group participants Course requirement: - Students must complete a minimum of 90% of homework and 50% of these must have a score higher than 6.5 - Major assignments must be submitted before the final exam.
Reading list	Main textbooks: [1] T.H.G. Megson, "Aircraft Structures for Engineering Students", Seventh Edition, 2021 [2] R.C. Hibbeler, Mechanics of Materials, Tenth Edition, 2017 Reference documents: [1] Lufthansa Technical Training GmbH, “AMF ATA 51 - Structures”, Lufthansa, 2000. [2] Michael C.Y.Niu, “Airframe Structural Design”, Conmilit Press Ltd., 1988. [3] Howe D., “Aircraft Loading and Structural Layout”, Professional Engineering Publishing Limited, 2004. [4] A. Kassimali, "Matrix Analysis of Structures", Second Edition, 2012

Aircraft Propulsion System **Course ID: TR3137**

Module designation	AIRCRAFT PROPULSION SYSTEM
Semester(s) in which the module is taught	6
Person responsible for the module	Dr. Tran Tien Anh
Language	Vietnamese / English
Relation to curriculum	Compulsory subject
Teaching methods	Lectures, Tutorial, Projects, Self-study
Workload (incl. contact hours, self-study hours)	Total workload: 150 hours - Lecture and exercise on class: 30 hours - Tutorial: 24 hours - Project: 9 hours - Self Study 72 hours - Others: 15 hours
Credit points	3 credits (ECTS: 6)
Required and recommended prerequisites for joining the module	None
Module objectives/ intended learning outcomes	Upon completion of this course, students know how to: + present an overview of the structure and operating principles of various types of propulsion systems used on aircraft + understand related basic concepts such as thermal efficiency, thrust efficiency, fuel consumption (per thrust unit) + present and analyze the operating cycle of piston engine + present and analyze the working cycle of gas turbine engine + analyze and evaluate the performance of different propulsion systems (piston engine, gas turbine engine...); + analyse and select suitable propellers for each propulsion system: piston engine, tubopro engine, propfan. + describe and apply the propeller theory: calculate the new design of the propeller based on the propeller theory.

Content	This subject provides students with the general knowledge about aircraft propulsion system, working principles and primary characteristics of various types of engine used for aircraft propulsion. In addition, this course also presents knowledge about propeller engine, theory and computational skills in design of propeller based on classical design theories. + Have general knowledge and working principle of aircraft propulsion systems + Understand the concepts of thermal efficiency, propulsive efficiency, thrust specific fuel consumption (TSFC) + Understand the basic theory of piston-prop engine + Understand and can use the propeller theory to design propeller blades + Understand working cycle of jet engines + Understand characteristics of aircraft propulsion systems Week 1: Classifications of aircraft propulsion systems Week 2: A review of basic laws for a compressible flow Week 3: Gas power cycles Week 4: Gas power cycles (continued) Week 5: Piston engines Week 6: Piston engines (continued) Week 7: Propeller theory Week 8: Propeller theory Week 9: Turbine-based engines: turbojet, turbofan Week 10: Turbine-based engines: turbojet, turbofan (continued) Week 11: Turbine-based engines: turbojet, turbofan (continued) Week 12: Shaft engines: turboprop, turbo-shaft, and prop-fan Week 13: Shaft engines: turboprop, turbo-shaft, and prop-fan (continued) Week 14: Propulsion system characteristics Week 15: Propulsion system characteristics (continued)
Exams and assessment formats	- Multiple choice quizzes - Group homeworks - Assignment - One final exam (90 minutes)
Study and examination requirements	Requirements for successfully passing the course: - The final grade in the course is composed of 50% performance on final exams, 10% assignment, 20% group homeworks, 20% Multiple choice quizzes. Students must have a final grade of 5.0/ 10.0 or higher to pass.
Reading list	**Textbooks:** [1]. Ahmed F. El-Sayed (2016). *Fundamentals of aircraft and rocket propulsion*. UK, London: Springer-Verlag London. [2]. David R. Greatrix (2012). *Powered flight-The engineering of aerospace propulsion*. UK, London: Springer-Verlag London. [3]. Anderson Jr. John D. (2012). *Aircraft performance and design*. USA, New Yorks: The McGraw-Hill Companies. **References:** [4]. E. L. Houghton & P.W. Carpenter (2013). *Aerodynamics for engineering students (6th edition).* USA, MA: Elsevier. [5]. J. Gordon Leishman (2006). *Principles of helicopter aerodynamics.* Cambridge Aerospace Series. [6]. Hans Reissner (1942). *Theory of propellers*. Brown University.

Module designation	Internship – TR3365
Semester(s) in which the module is taught	6
Person responsible for the module	Dr. Vuong Thi Hong Nhi
Language	Vietnamese / English
Relation to curriculum	Compulsory
Teaching methods	Self-study
Workload (incl. contact hours, self-study hours)	Total workload: 100 hours Projects: 90 hours Others: 10 hours
Credit points	2 credits (ECTS: 4)
Required and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	This course gives students an approach to work as an engineer: the apprentice and learning about the practical experience in exploitation, repair, and maintenance of aircraft before graduation thesis. Students can also choose a research-oriented project. L.O.1 - Conceptualization, development of an engineering problem and solution from business context. L.O.2 - Ability to identify, express and solve technical problems: ability to apply the engineering thinking given the context of specific business environment, as well as the ability to manage and assure the quality. L.O.3 - Having skills to communicate effectively: to present and express ideas through words and pictures through business meetings and final reports; to communicate in foreign languages.

Content	During the internship, students are assigned the responsibility to learn about the job and the role of an engineer in organization and management of production in factories; technical management, inspection and evaluation of product quality ...They can also explore the possibility to identify a technical problem in the company into a graduation thesis. Also, students are expected to improve their communication and writing skills. Each student writes an internship report of about 20 pages, which fully presents his or her understandings, log of activities, and research output during his or her internship
Exams and assessment formats	Projects: 100%
Study and examination requirements	Students are guided and evaluated by the internship employers. Students are required to submit an internship report at the end of the internship. The internship report must fulfill all the requirements designated by the Department in another document.
Reading list	[1] Reference materials are presented by employers.

Module designation	Aerospace Engineering Lab 3
Semester(s) in which the module is taught	7
Person responsible for the module	Msc. Dang Trung Duan
Language	English - Vietnamese
Relation to curriculum	Compulsory
Teaching methods	Blended learning Practise-based learning
Workload (incl. contact hours, self-study hours)	Total: 50 hours - Labs/Practices: 30 hours - Self-study: 15 hours - Others: 15 hours
Credit points	1 credits (2 ETCS)
Required and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	Aerospace Engineering Lab 3 provides students with practice and knowledge in the following subjects: analysis and measurrement of aerodynamic forces and moments, investigation offracture mechanics, understanding the performance of turbojet engine, determination of airplane Euler state angle (roll, pitch, yaw), practical aspects in aircraft design. L.O.1 - Strictly comply with laboratory rules, operating procedures as well as regulations on labor safety. L.O.2 - Develop team work skill by sharing work load and active contribution L.O.3 - Understand the parameters and characteristics of the device as well as the experimental procedure. L.O.4 - Analyze experimental data and explain phenomena based on fundamental knowledge. L.O.5 - Compare the obtained data with different reliable data sources o draw appropriate comments and conclusions.

Content	Lesson 1: Introduce course's objectives - Lecturer s profile - Learning strategies - Present experiment report Lesson 2: Measurement of lift and drag on three blades with different aspect ratios Lesson 3: Measurement of aerodynamics characteristics of 2D wing with sub-leading edge Lesson 4: Processing experimental data on the BWB monoplane model - Mechanics of Destruction - Experiment to investigate the influence of tilt angle on the breaking force. Lesson 5: Experiment on the effect of stress concentration on the cracking process of materials Lesson 6: Experimental performance characteristics of turbojet engines Lesson 7: Measurement of the Euler angle of the aircraft motion Lesson 8: Surveying the geometry of the airplane model, evaluating the features and stability of the airplane model
Exams and assessment formats	+ Labs/Practices: 30% + Experimental reports: 70%
Study and examination requirements	+ Students must present at least 5 minutes before the starting time of class. The group with students who are late will not be allowed to take the experiment and receives a score of 0 for that lab lesson. + Students read the content of the lab lesson, experimental steps, the equipment operations and prepare the table to record the experimental data. + Students must bring smartphones or laptops to do the quiz at the beginning of each lab lesson on Bkel. The group of students with a Quiz score <70% will not be allowed to do the experiment and receives a score of 0 for that lab lesson. + Students do experiments, process data and complete report files before lab lesson end and submit reports according to the link on Bkel at the end of each lab lesson. Therefore, each group has a laptop ready to complete the report right in class. The group that does not complete the report on time will be deducted 2 points on lesson score. + Students submit hard copies of their reports before one week after lab lesson ended. + To be able to gather knowledge, and get learning outcomes, students are required to regularly attend course sessions. If there is no reason for not attending the class more than 2 times, the student is not eligible to evaluate the subject results
Reading list	Aerospace Engineering Document

Module designation	**Sensors and Signals**
Semester(s) in which the module is taught	7, 8
Person responsible for the module	Assoc. Prof. Dr. Ngô Khánh Hiếu
Language	English - Vietnamese
Relation to curriculum	Elective
Teaching methods	Blended learning, Practise-based learning
Workload (incl. contact hours, self-study hours)	Total workload: 150 hours - Lecture and exercise on class: 30 hours - Project: 45 hours - Self Study 60 hours - Others: 15 hours
Credit points	3 credits (6 ETCS)
Required and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	The course provides knowdges on the feature and the function of the sensors for use in aircraft. The transmission and processing of signal. intended learning outcomes - Demonstrate basic features, operating principle and function of common sensors used in airplanes. - Discuss the principles and analyze the operation of the digital processor in data acquisition. - Realize “work-ready engineers” in application of the sensors and signals. - Present of the group project on the design of a measurement system using sensors.

Content	This course provides the basic concepts of the measurement techiniques, sensors, and signal; the construction and principle of operation of common type of sensors in aircraft; the principle and operation of the data acquisition system; the use of Z and Fourier transform in data analysis in frequency domain; the features and operation of digital filters. Week 1: Introduction of the course - Instructor's informations - Related issues - Teaching and learning methodology Basic definition and specification of measurement technique , sensors, and signals: - The characteristics of the measurement technique - Classification of sensors, signals - Factors affecting the measurement results - Measurement error - Properties of the measurement Week 2: Temperature sensor - Classification of temperature sensors - Resistance thermometer: + Structure + Principle of operation + Basic features Thermocouple sensor: + Structure + Principle of operation + Basic features. Week 3: Position and displacement sensors - Principle and method of measuring position and displacement - Basic characteristics of position and displacement sensors. Week 4: Strain gauge sensor - Principle and method of measuring strain gauge sensor - Basic characteristics of strain gauge sensors Week 5: Speed sensor, accelerometer - Principle and method of measuring speed - Basic characteristics of the speed sensor - Principle and method of measuring acceleration Week 6: Accelerometer and vibration speed sensor - Basic characteristics of accelerometer sensor - Principle and method of measuring vibration speed - Basic characteristics of vibration tachometer sensor. Week 7: Flow meter sensor - Principle and method of measurement - Basic features. Week 8: Liquid level sensor - Measurement principles and methods - Basic features Week 9: Fluid pressure sensor - Principles and methods of measuring fluid pressure - Basic characteristics of the fluid pressure sensor.. Week 10:

	Digital signals and digital signal processing systems - Definition of digital signals and digital processing systems - Analysis of digital processing system.. Week 11: Application of the Z transform in the analysis of digital processing systems - The concept and properties of the Z transformation - Application of the Z transform in the analysis of digital processing systems. Week 12: Application of Fourier transform in the analysis of digital processing systems. - The concept and properties of the Fourier transform - Application of Fourier transform in the analysis of digital processing systems Week 13: Digital filter - Ideal digital filter - FIR digital filter Week 14: FIR digital filter. Week 15: Course reviews
Exams and assessment formats	- One mid-term test (60 minutes) - Assignment - Project One final exam (90 minutes)
Study and examination requirements	Requirements for successfully passing the course: The final grade in the course is composed of 40% performance on final exams, 10% assignment, 30% project, 20% mid-term test. Students must have a final grade of 5.0/10.0 or higher to pass.
Reading list	[1]. Sensor handbook, CRC Press LLC, 1999. [2]. Richard S. Figliola, Donald E. Beasley, Theory and design for mechanical measurements, 3rd edition, John Wiley & Son Inc., 2011. [3]. P. Castittlo, R. Lozano, A. E. Dzul, Modeling and control of mini-flying machines. Springer Verlag London Limited, 2005. [4]. The scientist and engineering guide to DSP. [5]. Mixed signal and DSP design techniques.

Computational Fluid Dynamics **Course ID: TR4047**

Module designation	Computational Fluid Dynamics - TR4047
Semester(s) in which the module is taught	7, 8
Person responsible for the module	Dr. Vuong Thi Hong Nhi
Language	Vietnamese / English
Relation to curriculum	Free Elective
Teaching methods	Lectures/Projects
Workload (incl. contact hours, self-study hours)	Total workload: 150 hours - Lecture and exercise on class: 30 hours - Project: 45 hours - Self Study 60 hours - Others: 15 hours
Credit points	3 credits (6 ETCS)
Required and recommended prerequisites for joining the module	None

Module objectives/intended learning outcomes	- To provide students with fundamental numerical methods in solving partial differential equations of aerodynamic and heat transfer problems - To provide students with finite difference methods and finite volume methods to solve basic problems - To develop ability to write programs to solve simple partial differential equations and to use commercial codes to solve complex aerodynamic problems. - Introduction to computational fluid dynamics. Discrete approximation of derivatives. Classification of partial differential equations. Properties of numerical solution methods. Finite difference method for 1D steady-state problems including diffusive, diffusive-convective systems and diffusive-convective system with flow, 1D parabolic systems with explicit, implicit, Crank-Nicolson, and combined method for discretisation schemes. Finite volume method. Effect of turbulence on Reynolds time-averaged equations. Finite volume method for pure diffusion problems, diffusive-convective problems and solution algorithms for pressure-velocity coupling in steady flows. Analysis of SIMPLE, SIMPLER, SIMPLEC and PISO algorithm used in commercial CFD codes. L.O.1 - Understanding basic concept, properties and procedure in the numerical solution of fluid dynamics and heat transfer. L.O.2 - Applying the control volume method to establish discretisation schemes for the conservation equations of diffusion and convection with respect to space and time. L.O.3 - Applying a commercial of open source software for a practical fluid dynamic or heat transfer problem. L.O.4 - Collaborate with group members to jointly complete class discussion topics and projects.

Content	- The understanding basic concept of numerical simulation, analyzing mathematical models. - Understanding the basic concept of classification of partial differential equations. Understanding and applying how to use Taylor's development for derivative approximation, properties of numerical simulation. - Understanding and applying the numerical approaches for solving the linear system equation. - Understanding and applying the finite difference method and error evaluation method. - Understanding and applying temporal discretization for time derivatives. Understanding, applying stability analysis for the numerical scheme. - Understanding the finite volume method. - Understanding the methodology of coupling procedure for velocity and pressure solution in Navier-Stokes Equations. - Understanding the effect of the numerical scheme on the convection term
Exams and assessment formats	Tutorial: 20% Projects: 10% Midterm Exam: constructed response, 60 minutes, 20% Final Exam: constructed response, 90 minutes, 50%
Study and examination requirements	Students should follow these requirements: - In order to acquire fundamental numerical methods in fluid dynamics, students are required to attend class regularly. If students exceed 3 class – absences without reasonable excuses, he/she will not be allowed to participate in the exam - Students are expected to do exercises independently at home after theoretical chapters and return them to the lecturer at the due date - Students should take part in group working to write programs to solve numerically fundamental problems in CFD Requirements for successfully passing the course: The final grade in the course is composed of 50% performance on final exams, 20% assignment, 10% project, 20% mid-term test. Students must have a final grade of 5.0/10.0 or higher to pass.

Reading list	[1] An introduction to Computational Fluid Dynamics, H.K Versteeg and W.Malalasekera, Prentice Hall 1995 [2] Computational Methods for Fluid Dynamics, J.H Ferziger and M.Peric, Springer 1993 [3] Finite Difference Methods in Heat Transfer, M.Necati Ozisik, CRC Press 1994

Finite Element Method **Course ID: TR4051**

Module designation	TR4051 - Finite Element Method
Semester(s) in which the module is taught	7, 8
Person responsible for the module	Nguyen Song Thanh Thao
Language	Vietnamese/English
Relation to curriculum	Elective
Teaching methods	- Blended learning - Project-based learning
Workload (incl. contact hours, self-study hours)	Total workload: 150 hours - Lecture and exercise on class: 30 hours - Project: 45 hours - Self Study 60 hours - Others: 15 hours
Credit points	3
Required and recommended prerequisites for joining the module	Required: None Recommended: None
Module objectives/intended learning outcomes	The finite element method (FEM) is used to solve effectively the complex problems in mechanics. FEM obtained numerically approximate solutions using a variety of mathematical equations. This course provides a basic introduction to the FEM theory and its applications to engineering problems. The use of a commercial program in a project will provide the students an overview of the capabilities and limitations of this method. L.O.1 - Understand the basic theory of Finite Element Method in linear analysis L.O.2 - Formulate a finite element analysis for simple and complex structural systems, for one-dimensional, two-dimensional, and three-dimensional problems L.O.3 - Apply Finite Element Method in other technical problems

	L.O.4 - Solve posed design problems using Finite Element Method implemented in a commercial program
Content	- Chapter 1: Introduction to the Finite Element Method - Chapter 2: Matrix algebra and Gaussian elimination method - Chapter 3: General Steps of the finite element method - Chapter 4: One-Dimensional Problems - Chapter 5: Trusses - Chapter 6: Beams and frames - Chapter 7: Two-dimensional problems - Chapter 8: Axisymmetric solids subjected to axisymmetric loading - Chapter 9: Two-dimensional isoparametric elements and numerical integration - Chapter 10: Plate and shell structures - Chapter 11: Three-dimensional element - Chapter 12: Finite elements in the calculation of composite materials and structures - Chapter 13: Application to heat transfer problems - Chapter 14: Dynamic analysis
Exams and assessment formats	The final score is evaluated throughout the study process as follows. - Exercises: 20% - Projects: 10% - Mid-term exam: constructed response, 60 minutes, 20% - Final exam: constructed response, 60 minutes, 50%
Study and examination requirements	Learning Strategies - Students should ensure a sufficient participating-time in class - Students should do diligently the homework exercises - Students should promote group working and share experiences among group participants Course requirement: - Students must complete a minimum of 90% of homework and 50% of these must have a score higher than 6.5

	- Major assignments must be submitted before the final exam.
Reading list	Main textbooks: [1] S.S. Rao. The Finite Element Method in Engineering: Sixth Edition. Elsevier Inc. (2018) [2] T.R. Chandrupatla, A.D. Belegundu. Introduction to Finite Elements in Engineering: Fìrth Edition. (2022) Reference documents: [1] Y.W. Hwon, H. Bang. The Finite Element Method Using MATLAB: Second Edition. CRC Press (2000) [2] Klaus, J. Bathe. Finite Element Procedures. Prentice-Hall of India, New Delhi (2005) [3] O. C. Zienkiewicz, R. L. Taylor. The Finite Element Method: Fourth Edition. McGraw-Hill Book Company Inc (1994) [4] Akin J. E. Finite Element for Analysis and Design. Academic Press Limited, London (1994) [5] 0.0. Ochoa, J.N. Readdy. Finite Element Analysis of Composite Laminates. Klwer Academic Publisher (1992)

Rocket engines Course ID: TR4057

Module designation	ROCKET ENGINES
Semester(s) in which the module is taught	6, 7, 8
Person responsible for the module	Dr. Tran Tien Anh
Language	Vietnamese, English
Relation to curriculum	Elective subject
Teaching methods	Lectures, Tutorial, Projects, Self-study
Workload (incl. contact hours, self-study hours)	Total work load (hours): 124.67 -Lectures: 30 -Tutorial/ Exercise: 12 -Projects: 27 -Self-study: 93
Credit points	3 credits (ECTS: 4.5)
Required and recommended prerequisites for joining the module	None
Module objectives/ intended learning outcomes	By the end of this course students will be able to: + Determine the thrust and fuel consumption of gas turbine and turboprop engines + Understand advantages/disadvantages of turbojet, turboprop, turbofan, and ramjet airbreathing propulsion systems + Understand the thermodynamics of the Brayton cycle and how they contribute to overall propulsion system performance + Understand the role and fundamental performance of gas turbine components + Determine the basic performance and/or design of axial turbines and compressors + Determine the basic performance of airbreathing combustors.

Content	The subject provides the fundamental knowledge of Propulsion systems for rockets. Course contents are: introduction to how rocket engines work; cction and reaction: the space baseball scenario; thrust; solid-fuel rockets: fuel mixture; solid-fuel rockets: channel configuration; liquid-Propellant Rockets; the future of rocket engines. This class focuses on chemical rocket propulsion systems for launch, orbital, and interplanetary flight. It studies the modeling of solid, liquid-bipropellant, and hybrid rocket engines. Thermochemistry, prediction of specific impulse, and nozzle flows including real gas and kinetic effects will also be covered. Other topics to be covered include structural constraints, propellant feed systems, turbopumps, and combustion processes in solid, liquid, and hybrid rockets. The course is intended to serve as an introduction to rocket propulsion systems. Students are exposed to ideal rocket propulsion system performance prediction and a brief discussion of various efficiencies associated with deviations from ideal behavior. Basic propulsion system design is stressed with a brief discussion of mission requirements and trajectory analysis included to enable complete sizing studies. A class project involving analysis, thrust and drag measurements, and parachute behavior provides background in actual issues associated with operation of these systems. Week 1: Brief history of rocketry, classification of rocket propulsion systems Week 2: Brief history of rocketry, classification of rocket propulsion systems Week 3: Ideal rocket nozzle performance: Review of 1-D compressible flow, rocket performance fundamentals Week 4: Ideal rocket nozzle performance: Nozzle design, deviations from ideal performance Week 5: Rocket design fundamentals: Mission requirements for launch vehicles, upper stages Week 6: Rocket design fundamentals: Ballistic missiles, and interceptors Week 7: Trajectory analysis: The rocket equation, vertical trajectories Week 8: Trajectory analysis: Multistage rockets, generalized 2-D trajectories Week 9: Combustion and thermochemistry: Perfect gas law and thermodynamics review, chemical equilibrium Week 10: Combustion and thermochemistry: Adiabatic flame temperature calculations, rocket nozzle thermochemistry Week 11: Solid rocket motors: General description, interior ballistics Week 12: Solid rocket motors: Component design techniques Week 13: Liquid rocket engines: General description, engine cycles, power balance calculations, component design fundamentals Week 14: Electric propulsion (time permitting): Classification of electric propulsion systems, performance analysis Week 15: Tests and rocket launch project

Exams and assessment formats	- Multiple choice quizzes - Group homeworks - Assignment - One final exam (90 minutes)
Study and examination requirements	Requirements for successfully passing the course: The final grade in the course is composed of - 20% Multiple choice quizzes. - 10% group homeworks, - 20% assignment, - 50% performance on final exams, Students must have a final grade of 5.0/ 10.0 or higher to pass.
Reading list	**Textbooks:** [1]. Sutton, George, and Oscar Biblarz. Rocket Propulsion Elements. New York, NY: Wiley-Interscience, 2000. [2]. Hill, Philip and Carl Peterson. Mechanics and Thermodynamics of Propulsion. Upper Saddle River, NJ: Prentice Hall, 1991. **References:** [3]. Rohsenow, Warren, James Hartnett, and Young Cho. Handbook of Heat Transfer. New York, NY: McGraw-Hill, 1998. [4]. McAdams, William Henry. Heat Transmission. Melbourne, FL: Krieger Publishing, 1985, pp. 82-97. [5]. Hagemann, Gerald, Hans Immich, Thong Van Nguyen, and Gennady Dumnov. "Advanced Rocket Nozzles." Journal of Propulsion and Power 14, no. 5 (September-October 1998). [6]. Sirignano, William. "Current Status of Spray Combustion Modelling." 39th AIAA/ASME/SAE/ASEE Joint Propulsion Conference, Huntsville, Alabama, July 20-23 2003.

Module designation	**Aircraft Systems Identification**
Semester(s) in which the module is taught	7, 8
Person responsible for the module	Khanh-Hieu NGO, Dinh-Tri NGO
Language	English/Vietnamese
Relation to curriculum	Elective, Major Course
Teaching methods	Lecture, Project Blended learning, Project-based learning
Workload (incl. contact hours, self-study hours)	'Total workload: 150 hours - Lecture and exercise on class: 30 hours - Project: 45 hours - Self Study 60 hours - Others: 15 hours
Credit points	3 credits (6 ECTS)
Required and recommended prerequisites for joining the module	Flight Mechnics, Aircraft Stability and Control
Module objectives/intended learning outcomes	This course provides the theory and methods of building mathematical models for aircraft based on measure data. Alls aspects of aircraft system identification are included: experiment design, instrumentation, data handling, model formulation, model parameter estimation, model validation, and applications.. **Intended learning outcomes** L.O.1 Demonstrate the methods to develop the mathematical representation for dynamic systems such as aircraft based on in-flight measured data or data from experiments. L.O.2 Demonstrate the important aspects of aircraft system identification including: experiment design, instrumentation, data handling, model formulation, model parameter estimation, model validation. L.O.3 Apply the tools namely Matlab/AeroSim, SIDPAC, CIFER for system identification of a typical aircraft. L.O.4 Actively participate in class discussions and contribute to effective group coordination for group projects.

Content	Chapter 1: Elements of System Theory Chapter 2: Mathematical Model of an Aircraft Chapter 3: Outline of Estimation Theory Chapter 4: Regression Methods Chapter 5: Maximum Likelihood Methods Chapter 6: Frequency Domain Methods Chapter 7: Real-time Parameter Estimation Chapter 8: Experiment Design Chapter 9: Practical Input Optimization for A/C Parameter Estimation Experiments Chapter 10: Frequency-Domain Identification Method Applied to the XV-15 Tilt-Rotor Aircraft
Exams and assessment formats	-Tutorial: 10% -Projects: 30% Midterm assessment (60 minutes): Constructed response/Quiz Final exam (90 minutes): Constructed response, Quiz
Study and examination requirements	Students must have a final grade of 50% or higher to pass. The final grade includes: -Tutorial: 10% -Projects: 30% -Mid-term exam: 20% - Final exam: 40%
Reading list	[1] Klein, V., and Morelli, E. A., Aircraft system identification, AIAA Education Series, 2006. [2] Ogata, K., Modern control engineering, 5th edition, Prentice Hall, 2010. [3] Morelli, E. A., Aircraft system identification, NASA online training video, http://mediaex-server.larc.nasa.gov/Academy/Play/b7f1aa581b4d4f3b96aeec879544951c1d [4] Morelli, E. A., Aircraft system identification, NASA online training video, http://mediaex-server.larc.nasa.gov/Academy/Play/b7f1aa581b4d4f3b96aeec879544951c1d [5] SIDPAC, System identification programs for aircraft, software package, Ver. 2.0, August 2006, http://dcb.larc.nasa.gov/DCBStaff/eam/SIDBook_SIDPAC.htm.

Module designation	TR4069 – Avionics
Semester(s) in which the module is taught	7, 8
Person responsible for the module	Ngo Khanh Hieu
Language	Vietnamese/English
Relation to curriculum	Elective
Teaching methods	- Blended learning
Workload (incl. contact hours, self-study hours)	Total workload: 150 hours Contact hours: - Lecture and exercise on class: 30 hours - Project: 45 hours - Self Study 60 hours - Others: 15 hours
Credit points	3
Required and recommended prerequisites for joining the module	Required: None Recommended: None
Module objectives/intended learning outcomes	The objective of this course is to provide the basic description of components, sensors, computers related to functions, controls, operational and monitoring principles of indicating and recording system; electrical power system; auto-flight system; communication systems; fire protection system; ice and rain protection system; lighting system; and navigation system on civil aviation. This course aims students to satisfy the 05 following learning outcomes: L.O.1 – Understand and demonstrate basic knowledge about the principles, operation and control of the electrial and electronic equipment, automatic control system on aircraft L.O.2 – Understand operations and controls of related components and systems installed in civil aircraft L.O.3 – Understand technical terms related to defects of aircraft system, figure out maintenance steps/procedures and have some basic skills to isolate defective causes as per trouble-shooting manual L.O.4 – Acknowledge potential risks against human and equipment able to affect flight safety if maintenance steps/procedures are not complied

	L.O.5 – Improve teamwork skill and be confident with public speaking, eye-contact skills of communication, presentation, especially in English
Content	- Chapter 1: Introduction to course - Chapter 2: Aircraft indicating and recording systems - Chapter 3: Aircraft electrical power system - Chapter 4: Practical aircraft maintenance on the indicating/recording system; the electrical power system - Chapter 5: Aircraft auto-flight system - Chapter 6: Practical aircraft maintenance on auto-flight system - Chapter 7: Aircraft communication system - Chapter 8: Aircraft fire protection system - Chapter 9: Aircraft ice and rain protection system - Chapter 10: Aircraft lighting system - Chapter 11: Navigation system on civil aviation - Chapter 12: Practical aircraft maintenance on navigation system on civil aviation
Exams and assessment formats	The final score is evaluated throughout the study process as follows. - Exercises: 10% - Projects: 30% - Mid-term exam: constructed response, 60 minutes, 20% - Final exam: constructed response, 90 minutes, 40%
Study and examination requirements	Learning Strategies - Students should ensure a sufficient participating-time in class - Students should do diligently the homework exercises - Students should promote group working and share experiences among group participants Course requirement: - Students must complete a minimum of 90% of homework and 50% of these must have a score higher than 6.5 - Major assignments must be submitted before the final exam.
Reading list	Textbooks: [1] Mike Tooley, “Aircraft Digital Electronic and Computer Systems”, Routledge, Taylor & Francis Group, 2nd edition, 2015. Reference books: [1] Basic training ATA, EASA Part 66.

Design Optimization **Course ID: TR4071**

Module designation	Design Optimization - TR4071
Semester(s) in which the module is taught	7, 8
Person responsible for the module	Vu Ngoc Anh
Language	Vietnamese / English
Relation to curriculum	Elective
Teaching methods	Total workload: 150 hours - Lecture and exercise on class: 30 hours - Project: 45 hours - Self Study 60 hours - Others: 15 hours
Workload (incl. contact hours, self-study hours)	Lectures/Tutorial/Projects
Credit points	3
Required and recommended prerequisites for joining the module	NA
Module objectives/intended learning outcomes	- Comprehend how to formulate optimization problems - Comprehend optimization methods for single and mutidisciplinary design optimization L.O.1 - Demonstrate the basic concepts and formulate a design optimization problem. L.O.2 - Apply the various optimization methods for the design mission. L.O.3 - Understand multidisciplinary design optimization (MDO) applied in Aerospace Engineering. L.O.4 - Actively participate in group projects and submit a group report on the application of optimization method for a design mission in Aerospace Engineering.
Content	The course addresses definitions of design optimization, process to formulate design optimization and aspects to solve design optimization. Constrained and unconstrained problem will be presented. Gradient Based Optimization, Introduction to Stochastic Optimization and Surrogate Modeling are presented. Introduction to Multidisciplinary Design Optimization in Aerospace is presented at the end of the course.

Exams and assessment formats	Tutorial: 10% Projects: 30% Midterm Exam: Quiz or Constructed response, 60 minutes, 20% Final Exam: Quiz and Constructed response, 90 minutes, 40%
Study and examination requirements	Students are requested to often access to the website of department to update the lecture notes and assignments . All assignments are requested to complete and submit to teaching assistant on due date. Students may be banned from final exam if they are absent more than 30% of the class. The final grade in the course is composed of 40% performance on final exams, 10% assignment, 30% project, 20% mid-term test. Students must have a final grade of 5.0/10.0 or higher to pass
Reading list	[1] Jasbir S. Arora, "Introduction to Optimization Design", 2nd Ed. Elsevier Press, 2004. [2] Garret N. Vanderplaats, "Numerical Optimization Techniques for Engineering Design", 2nd Ed. McGraw-Hill, 1984. [3] Steven C. Chapra, Raymond P. Canale, "Numerical Methods for Engineers", 6th Edition, McGraw-Hill, 2010

Module designation	**IMPACT MECHANICS**
Semester(s) in which the module is taught	6, 7, 8
Person responsible for the module	Assoc. Prof. Dr. Ly Hung Anh
Language	Vietnamese
Relation to curriculum	Elective
Teaching methods	Lectures, Tutorial, Projects, Self-study
Workload (incl. contact hours, self-study hours)	Total work load: 150 Hours - Lecture: 30 hours - Projects: 45 hours - Self-study: 60 hours - Others: 15 hours
Credit points	3 credits (ECTS: 6)
Required and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	Upon completion of this course, students know how to: - Understanding the concepts, principles and safety equirements in the impact phenomena. - Apply the numerical simulation for a simplified impact problem. - Behavior of different geometrical tube subjected to various kind of impact load. - Actively participate in group projects to solve the impact simulation problem and make a group report analyzing the behavior of the structure.
Content	The Impact Mechanics course amis to investigates the behavior of structures subjected to low-velocity impact load, that is, their crushing distance and forces. The investigated structures are thin-walled cylindrical structures. - Week 1: Introduction to Impact mechanics, initial concept of Crash safety (Crashworthiness). - Week 2: Factors that affect the structure during impact. - Week 3: Crushing force and displacement of circular and square - tubes structure subjected to axial impact load using numerical simualtion.. - Week 4, 5, 6: Behavior of thin-walled circular tube subjected to axial - impact load. - Week 7, 8, 9: Behavior of thin-walled square tube subjected to axial impact load. - Week 10, 11, 12: Behavior of thin-walled polygonal tube subjected to axial impact load. - Week 13, 14, 15: Behavior of thin-walled square and circular tubes subjected to three-point bending.

Exams and assessment formats	- One mid-term test (60 minutes) - Assignment - Project - One final exam (90 minutes)
Study and examination requirements	Requirements for successfully passing the course: The final grade in the course is composed of 40% performance on final exams, 10% assignment, 30% project, 20% mid-term test. Students must have a final grade of 5.0/10.0 or higher to pass.
Reading list	[1] A.G. Mamalis, D. E. Manolakos, G. A. Demosthenous, M. B. Ioannidis,"Crashworthiness of Composite Thin-Walled Structures", 1st Edition, CRC Press; eBook Published 27 September 2019. [2] Norman Jones, "Structural Impact", Second Edition, Cambridge University Press, 2012. [3] Guoxing Lu and Tongxi Yu, "Energy Absorption of Structures and Materials", Woodhead Publishing Limited, 2003. [4] T. Wierzbicki and W. Abramowicz. On the crushing mechanics of thinwalled structures. Journal of Applied Mechanics, Vol. 50, pp. 727–734, 1983. [5] Wlodzimiwez Abramowicz and Norman Jones. Dynamic axial crushing of square tubes. International Journal of Impact Engineering, Vol. 2, No. 2, pp. 179–208, 1984. [6] W. Abramowicz and T Wierzbicki. Axial crushing of multicorner sheet metal columns. Journal of Applied Mechanics, Vol. 56, pp. 113–120, 1989. [7] Paul Du Bois, Clifford C. Chou, Bahig B. Fileta, Tawfik B. Khalil, Albert I. King, Hikmat F. Mahmood, Harold J. Mertz, Jac Wismans, "Vehicle Crashworthiness and Occupant Protection", American Iron and Steel Institute, 2004.

Aerospace Engineering Design Project **Course ID: TR4079**

Module designation	Aerospace Engineering Design Project - TR4079
Semester(s) in which the module is taught	7
Person responsible for the module	Vu Ngoc Anh, Tran Tien Anh, Ly Hung Anh, Le Thi Hong Hieu, Ngo Khanh Hieu, Nguyen Song Thanh Thao, Vuong Thi Hong Nhi, Dang Trung Duan
Language	Vietnamese / English
Relation to curriculum	Compulsory
Teaching methods	Project-based learning
Workload (incl. contact hours, self-study hours)	Total workload: 100 hours Projects: 90 Others: 10
Credit points	2
Required and recommended prerequisites for joining the module	Recommended: - TR2011: Aerodynamics 1 - Incompressible Aerodynamics - TR3001: Flight Mechanics - TR3135: Aircraft Structures Analysis - TR3137: Aircraft Propulsion Systems Parallels: TR3365: Internship

Module objectives/intended learning outcomes	- Understand methods to analyze, and design an aerospace engineering problem - Know how to present scientific results by writing. L.O.1 - To solve the problems related to aerospace engineering, students are required to have the ability to conceptualize problems, master analysis-calculation and design methods, and choose the suitable methods regarding a particular purpose. L.O.2 - Students have to be able to perform analysis, technical data calculation and design a aerospace engineering problem in order to satisfy given requirements. L.O.3 - Students have the ability to write a report explaining the physcal and technical problems, as well as those analysis, calculation and design method for aerospace engineering problem, as well as to present technical issues using text and figures during oral examination. L.O.4 - Students have the ability to self-absorb, learn and explore materials through the process of making projects under the guidance of lecturers.
Content	This project work is designed to put students in practice with analysising, calculating and designing a aerospace engineering problem. Students are required to apply knowledge from presequisites to solve different tasks in this project.
Exams and assessment formats	Project Defense: 100%
Study and examination requirements	- A group, 2-4 students, is instructed by a professor assigned by Aerospace Department. Each student has to to complete his/her own works. - Weekly meeting among professors and students is required - Students are required to be active to solve problems by applying knowledge of studied subjects. - Student submit final report, drawings to instructor - Adviser evaluate the final report. - Students submit the evaluated final report and present their works to reviewer. Final grade is given by Reviewer. * Final report must be printed on 2 sides of A4 and comply with template format of aerospace department
Reading list	Following the adviser's guideline

Aircraft Design **Course ID: TR4081**

Module designation	Aircraft Design - TR4081
Semester(s) in which the module is taught	7
Person responsible for the module	Vu Ngoc Anh
Language	Vietnamese / English
Relation to curriculum	Compulsory
Teaching methods	Lectures/ /Projects
Workload (incl. contact hours, self-study hours)	Total workload: 150 hours Contact hours: - Lecture and exercise on class: 30 hours - Project: 45 hours - Self Study: 60 hours - Other: 15 hours
Credit points	3
Required and recommended prerequisites for joining the module	Recommended: - TR2011: Aerodynamics 1 - Incompressible Aerodynamics - TR3001: Flight Mechanics - TR3135: Aircraft Structures Analysis
Module objectives/intended learning outcomes	- Understand the conceptual design process for flight vehicle - Understand the preliminary design process for flight vehicle - Evalute the design and optimization L.O.1 - Apply the process of configuration design and preliminary design for aircraft. L.O.2 - Evaluate the design solution according to contemporary criteria including social demand, safety, environment and economics. L.O.3 - Develop team working for collecting information and tool management toward finalising the group report. L.O.4 - Present the aircraft design project in class.
Content	An aircraft design process will be introduced. Students will perform a team-based aircraft design project. Application of knowledge acquired and skill developed in the aerospace curriculum are required. Students will perform a full aircraft sizing process for their project.
Exams and assessment formats	Projects: 70% Final Exam: Constructed response, 100 minutes, 30%

Study and examination requirements	Students are requested to often access to the website of department to update the lecture notes and assignments. All assignments are requested to complete and submit to teaching assistant on due date. Students may be banned from final exam if they are absent more than 30% of the class. The final grade in the course is composed of 30% performance on final exams, 70% project, Students must have a final grade of 5.0/10.0 or higher to pass
Reading list	[1] Dieter, George Ellwood, Engineering design, McGraw-Hill,2000. [2] Jan Roskam, Aircraft Design, Part I: Preliminary Sizing of Aircraft, DARcorporation. [3] Jan Roskam, Aircraft Design, Part II: Preliminary Configuration Design and Integration of the Propulsion System, DARcorporation.

Module designation	TR4083 - Turbine Engines
Semester(s) in which the module is taught	7, 8
Person responsible for the module	Nguyen Thien Tong
Language	Vietnamese/English
Relation to curriculum	Elective
Teaching methods	- Blended learning - Project-based learning
Workload (incl. contact hours, self-study hours)	Total workload: 150 hours Lecture: 30 hours Projects: 45 hours Self-study: 60 hours Others: 15 hours
Credit points	3
Required and recommended prerequisites for joining the module	Required: None Recommended: None
Module objectives/intended learning outcomes	The objective of this course is to provide fundamental principles of gas turbine engines installed on aircrafts. Gas turbine engines include turbojet and turbofan engines for propulsion. Students going through this course will understand important components of gas turbine engines and thermal cycles of compressible gas flowing through compressor, burner, turbine, nozzle... in order to calculate thrust of gas turbine engines and get useful knowledge of their operations and applications. L.O.1 - Gain the general knowledge about the jet engine of the aircraft L.O.2 - Analyze the performance of jet engine on-design condition and off-design condition L.O.3 - Analyze the operation of turbomachinery L.O.4 - Understand of the factors affecting the engine performance of various engine components L.O.5 - Dimensional analysis and scaling-based designs

Content	- Chapter 1: General introduction of turbojet engines - Chapter 2: Thrust of turbojet engines - Chapter 3: Compressors and turbines - Chapter 4: Performance of components of turbojet engines - Chapter 5: Effect of each component to overall performance of turbojet engines - Chapter 6: Dimensional analysis and dynamic similarity of turbojet engines - Chapter 7: Turbojet engines for fighters
Exams and assessment formats	The final score is evaluated throughout the study process as follows. - Exercises: 20% - Projects: 10% - Mid-term exam: constructed response, 60 minutes, 20% - Final exam: constructed response, 60 minutes, 50%
Study and examination requirements	Learning Strategies - Students should ensure a sufficient participating-time in class - Students should do diligently the homework exercises - Students should promote group working and share experiences among group participants Course requirement: - Students must complete a minimum of 90% of homework and 50% of these must have a score higher than 6.5 - Major assignments must be submitted before the final exam.
Reading list	Textbooks: [1] Saeed Farokhi, “Aircraft Propulsion", Wiley, second edition, 2014 [2] Ahmed F. El-Sayed, "Aircraft Propulsion and Gas Turbine Engines", CRC Press, second edition, 2017 Reference books: [1] Nicholas Cumpsty, "Jet Propulsion", Cambridge University Press, 1997. [2] Jack D. Mattingly, "Elements of Gas Turbine Propulsion", McGraw-Hill, 1996. [3] Olivier Leonard, "Aircraft Propulsion", Course Notes, Liège University, 1999. [4] Ronald D. Flack, "Fundamentals of Jet Propulsion with Applications", Cambridge University Press, 2005

Vertical Take-off and Landing Aircraft Course ID: **TR4095**

Module designation	Vertical Take-off and Landing Aircraft - TR4095
Semester(s) in which the module is taught	7, 8
Person responsible for the module	Vu Ngoc Anh
Language	Vietnamese / English
Relation to curriculum	Elective
Teaching methods	Total workload: 150 hours Contact hours: - Lecture: 30 hours - Project: 45 hours - Self-study: 60 hours - Other: 15
Workload (incl. contact hours, self-study hours)	Lectures/Tutorial/Projects
Credit points	3
Required and recommended prerequisites for joining the module	NA
Module objectives/intended learning outcomes	- Understand classification advantages, disadvantages of VTOL aircraft - Comprehend operations of Helicopter - Comprehend momentum, blade element theory applied to helicopter - Comprehend Rotating blade motions L.O.1 - Present the classification, operating principles, description of components and application ranges of VTOL aircrafts L.O.2 - Apply the momentum and blade element theories to analyse the aerodynamic forces of VTOL aircrafts. L.O.3 - Communicate with the lecturer and collaborate with group members to jointly complete class discussion topics and group project. L.O.4 - Having the ability to search documents, write reports and analyze the aerodynamic implication in the VTOL aircraft performance.
Content	Student will be introduced vertical take off and landing aircraft, parts, operations, and some theories applied to helicopter aerodynamic analysis.

Exams and assessment formats	'-Tutorial: 10% -Projects: 30% - Mid-term exam: Constructed response, 90 minutes, 20% - Final exam: Constructed response, 90 minutes, 40%
Study and examination requirements	Students are requested to often access to the website of department to update the lecture notes and assignments. Assessment Scheme: - Tutorial: 10% - Projects: 30% - Mid-term exam: 20% - Final exam: 40% All assignments are requested to complete and submit to teaching assistant on due date. Students may be banned from final exam if they are absent more than 30% of the class.
Reading list	[1] Ngoc Anh Vu, Lecture notes, An overview of vertical take off and landing aircraft. [2] J. Gordan Leishman, "Principles of Helicopter Aerodynamics", 2nd Ed. Cambridge Press, 2006. [3] Wayne Johnson, "Helicopter Theory", Dover Publication, INC.

Module designation	FRACTURE MECHANICS AND FATIGUE
Semester(s) in which the module is taught	6, 7, 8
Person responsible for the module	Assoc. Prof. Dr. Ly Hung Anh
Language	Vietnamese
Relation to curriculum	Elective
Teaching methods	Lectures, Tutorial, Projects, Self-study
Workload (incl. contact hours, self-study hours)	Total work load (Hours): 150 - Lecture: 30 hours - Projects: 45 hours - Self-study: 60 hours - Others: 15 hours
Credit points	3 credits (ECTS: 6)
Required and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	Upon completion of this course, students know how to:
Content	Objectives of this course is providing fundamental knowledge in analyzing the theoretical background of linear and nonlinear fracture and fatigue mechanics; analyzing fracture mechanics of simple crack problems in linear materials; analyzing crack growth; predicting fatigue life using S/N curve; predicting fatigue life of notched components and simulating crack initiation and propagation by numerical methods. Week 1: Introduction to Fracturing mechanics and Fatigue. Week 2: An overview of Fracture mechanics and Fatigue. Week3: Linear Elastic Fracture Mechanic. Week4: Linear Elastic Fracture Mechanic (LEFM) – Stress distribution around crack tip. Week 5: Crack propagation criteria. Week 6: Crack propagation criteria by energy approach. Week 7, 8: Critical crack length and failure loading. Week 9: Introduction about Fatigue. Week 10: High cycle fatigue. Week 11: Low cycle fatigue. Week 12, 13: Analyze and evaluate crack propagation using FEM or XFEM. Week 14: An analysis report and evaluate the crack propagation in the plate. Week 15: Review and Q/A for final examination.

Exams and assessment formats	- One mid-term test (60 minutes) - Assignment - Project - One final exam (90 minutes)
Study and examination requirements	Requirements for successfully passing the course: The final grade in the course is composed of 40% performance on final exams, 10% assignment, 30% project, 20% mid-term test. Students must have a final grade of 5.0/10.0 or higher to pass.
Reading list	[1] T. L. Anderson, Fracture Mechanics Fundamentals and Applications, 4th Ed. CRC Press (2017). [2] S. Suresh, Fatigue of materials, Cambridge University press (1998). [3] D. Francois, A. Pineau, A. Zaoui, Mechanical Behaviour of Materials: Fracture Mechanics and Damage (2013).

Capstone Project **Course ID: TR4367**

Module designation	Capstone Project - TR4367
Semester(s) in which the module is taught	8
Person responsible for the module	Vu Ngoc Anh, Tran Tien Anh, Ly Hung Anh, Le Thi Hong Hieu, Ngo Khanh Hieu, Nguyen Song Thanh Thao, Vuong Thi Hong Nhi, Dang Trung Duan
Language	Vietnamese / English
Relation to curriculum	Compulsory
Teaching methods	Project-based learning
Workload (incl. contact hours, self-study hours)	Total workload: 200 hours Projects: 180 Others: 20
Credit points	*4*
Required and recommended prerequisites for joining the module	*-TR3365: Internship* *- TR4079: Aerospace Engineering Design Project*
Module objectives/intended learning outcomes	- Analyze and evaluate options. - Use presentation skills to persuade the relevant graduation thesis board. - Clear and concise presentation of research issues. - Carry out the design process for a specific object in the thesis

Content	The purpose of a thesis is to enable the student to develop deeper knowledge, understanding, capabilities, and attitudes in the context of the program of study. The thesis should be written at the end of the program and offers the opportunity to delve more deeply into and synthesize knowledge acquired in previous studies. A thesis for a bachelor's degree in aerospace engineering program should place emphasis on the technical/scientific/artistic aspects of the subject matter. The overall goal of the thesis is for the student to display the knowledge and capability required for independent work as a bachelor's degree in aerospace engineering. The learning objectives for a thesis are based on the objectives for a bachelor's degree. Specific learning outcomes for a bachelor thesis are for the student to demonstrate: Considerably more in-depth knowledge of the major subject/field of study, including deeper insight into current research and development work. Deeper knowledge of methods in the major subject/field of study. A capability to contribute to research and development work. The capability to use a holistic view to critically, independently, and creatively identify, formulate and deal with complex issues. The capability to plan and use adequate methods to conduct qualified tasks in given frameworks and to evaluate this work. The capability to create, analyze and critically evaluate different technical/architectural solutions. The capability to critically and systematically integrate knowledge. The capability to clearly present and discuss the conclusions as well as the knowledge and arguments that form the basis for these findings in written and spoken English. The capability to identify the issues that must be addressed within the framework of the specific thesis to consider all relevant dimensions of sustainable development. A consciousness of the ethical aspects of research and development work.
Exams and assessment formats	Project Defense: 100%

Study and examination requirements	− Each student assigned a topic or can be combined into a group project. − In the assigned tasks, there must be at least 2 areas of knowledge performed by students. − The minimum condition for a student to be protected is that the student must complete the work according to the assignment sheet of the supervisor. − Chapters (excluding appendices) presented in the glossary must be at least 50 (pages) and a maximum of 100 (pages). The proposed content chapters are as follows: Chapter 1: Overview 1.1. Introduce about ... 1.2. Objectives, tasks, and scope of the topic 1.3. Organization of the thesis Chapter 2: Calculation and design ... 2.1. Introduce 2.2. Calculate ... 2.3. Design ... 2.4. Conclude Chapter 3: Understanding and designing systems ... 3.1. Introduce 3.2. Research ... 3.3. Design ... 3.4. Conclude Chapter 4: Experiments and evaluation of results ... 4.1. Introduce 4.2. Experimental process ... 4.3. Experimental interpolation … 4.4. Evaluate accuracy ... 4.5. Conclude Chapter 5: Summary and topic development 5.1. Evaluate the achieved results 5.2. Development direction of the topic. Course requirement: Presenting A0 drawings for design subjects. Make a presentation to graduate council: 100% Conditions protected before the council: Students must pass a mid-term examination. At the end of the term, students are allowed to go to the council by the instructors and reviewers. At the end of the dissertation, each student will submit a one-sided explanatory note on A4 size paper with the following provisions: Hardcover page. Inner lining. Thesis assignment sheet signed by the department head. Thank you. Summary of the thesis. Table of contents. List of drawings (if any). List of tables (if any). List of abbreviations (if any). Content of main chapters. Appendix.

	References.
Reading list	[1] Jan Roskam, "Airplane design. Part III: Layout design of cockpit, fuselage, wing and empennage", DARcorporation, 1997. [2] Jan Roskam, "Airplane design. Part IV: Layout design of landing gear and systems", DARcorporation, 1997. [3] Jan Roskam, "Airplane design. Part V: Component weight estimation", DARcorporation, [4] Jan Roskam, "Airplane design. Part VI: Preliminary calculation of aerodynamics, thrust and power characteristics", DARcorporation, 1997. [5] Jan Roskam, "Airplane design. Part VII: Determination of control and performance characteristics", DARcorporation, 1997. [6] Jan Roskam, "Airplane design. Part VIII: Airplane cost estimation: design, development, manufacturing and operating", DARcorporation, 1997.