TRƯỜNG ĐẠI HỌC KHOA HỌC TỰ NHIÊN

KHOA CÔNG NGHỆ THÔNG TIN

TÓM TẮT NỘI DUNG CÁC MÔN HỌC
CHƯƠNG TRÌNH TIÊN TIẾN NGÀNH KHOA HỌC MÁY TÍNH

DANH MỤC

CS161 - Introduction to Computer Science I

- Tên tiếng Việt: **Nhập môn lập trình**
- Số tín chỉ: **4**

Mô tả vắn tắt:

This course is designed to introduce students to problem solving by programming in C++. Programming fundamentals include program structure, assignment, data types, repetition, input/output, flow of control, and functions. Program design development and testing is emphasized.

CS162 - Introduction to Computer Science II

- Tên tiếng Việt: **Kỹ thuật lập trình**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The course is the continuation of the Introduction to Computer Science I (CS161). It is designed to teach students arrays, pointers, linked list, file handling and an introduction to object-oriented programming.

CS163 - Data Structures

- Tên tiếng Việt: **Cấu trúc dữ liệu**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The course is designed to investigate the essential properties of data structures and algorithms for operating on them; to use these data structures as tools to assist algorithm design; to extend exposure to searching, sorting, hashing and recursive techniques. Above all, the goal for students in this course is to continue developing and improving skills in analysis, design, programming, and testing.

CS201 - Computer Systems Programming

- Tên tiếng Việt: **Lập trình hệ thống máy tính**
- Số tín chỉ: **4**

Introduction to computer systems from a software perspective. Topics include: Basic machine organization. System programming using C and assembly language. Introduction to system programming tools (gcc, makefile, gdb). Data representation (bits & bytes, characters, integers, floating point numbers, Implementation of control flow, procedure class, and complex data types at machine level. Linking and loading. Exceptions and interrupts. Process control and signals. System calls, File I/O. Timing and improving program performance. Introduction to memory hierachy, dynamic memory allocation techniques.

CS202 - Programming Systems

- Tên tiếng Việt: **Các hệ thống lập trình**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The course is designed to introduce to students the concepts of object-oriented programming while learning advanced C++ syntax. Students will understand the difference between procedural programming and object oriented programming. Students will learn and practice how to design and program with inheritance hierarchies, with the goal of solving problems efficiently: producing high quality, robust, maintainable as well as efficient object oriented solutions. Students will learn about C++'s classes, objects, function overloading, operator overloading, constructors, destructor, and be introduced to inheritance and polymorphism.

CS250 - Discrete Structures

- Tên tiếng Việt: **Cấu trúc rời rạc**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The course is designed to provide students with a solid foundation in discrete structures, including topics from logic, set theory, combinatorics, relation, probability theory, and graph theory.

CS251 - Logical Structures

- Tên tiếng Việt: **Cấu trúc logic**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The course is designed to help undergraduate computer science students to familiarize themselves with the basics of logics for computer science. Some topics in this course contains algorithms.

CS300 - Elements of Software Engineering

- Tên tiếng Việt: **Nhập môn Công nghệ phần mềm**
- Số tín chỉ: **4**

Mô tả vắn tắt:

This course is one of the first courses in software engineering. the course introduces basic concepts, principles, practices, methods, and tools in software engineering. It covers core elements of the software development lifecycle, including software requirements, analysis & design, implementation, testing, integration, maintenance, and management.

CS305 - Social, Ethical, and Legal Issues

- Tên tiếng Việt: **Đạo đức khoa học**
- Số tín chỉ: **2**

Mô tả vắn tắt:

The advancement of information technology has changed the way we leave, interact, and work. However, it also results in social, ethical, and legal issues that we have to address. This course will introduce students important social and professional issues related to information technology and provide opportunities for students to discuss real-world situations where social, ethical, and legal implications are relevant to the information technology profession.

CS311 - Computational Structures

- Tên tiếng Việt: **Cấu trúc tính toán**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The course is designed to provide students the foundations of computing: regular languages and finite automata; context-free languages and pushdown automata; Turing machines and equivalent models of computation; computability; introduction to complexity.

CS320 - Principles of Programming Languages

- Tên tiếng Việt: **Nguyên lý Ngôn ngữ lập trình**
- Số tín chỉ: **4**

Mô tả vắn tắt:

This course covers syntax and semantics of programs and introduces the design and goals of compilers and interpreters. During the course, we often view programs as data. Class introduces regular expressions, context-sensitive, and context-free grammars. We discuss procedural, structured, functional, and object-oriented programming, plus cover type systems, including dynamic and static typing disciplines. Briefly cover binding, scope, data abstraction, and modularity. We briefly introduce program correctness, and discuss numerous C, Java, or C++ source programs to highlight key language ideas.

CS333 - Introduction to Operating Systems

- Tên tiếng Việt: **Nhập môn Hệ điều hành**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The objective of this course is an understanding the fundamental concepts underlying contemporary operating systems. This course covers the following topics: process management, scheduling, synchronization, memory management, virtual memory, file system, and I/O management.

CS350 - Algorithms and Complexity

- Tên tiếng Việt: **Thuật toán và độ phức tạp**
- Số tín chỉ: **4**

Mô tả vắn tắt:

This course introduces students to the analysis and design of computer algorithms. Ther are case studies of existing algorithms (sorting, searching, graph algorithms, dynamic programming, etc).Upon completion of this course, students will be able to do the following:

- Analyze the asymptotic performance of algorithms.

- Demonstrate a familiarity with major algorithms and data structures.

- Apply important algorithmic design paradigms and methods of analysis.

- Synthesize efficient algorithms in common engineering design situations.

- Apply algorithms, data structures, and programming skills to solve real problems.

CS404 - Internship

- Tên tiếng Việt: **Thực tập thực tế**
- Số tín chỉ: **4**

Mô tả vắn tắt:

This course is to give students opportunities to know and experience the real working context at a Computer Science company or professional organization as full-time interns. The interns have opportunities to take part in the company's real projects. They can discover organization structures, roles and responsibilities within that structure, the processes applied at the company; demonstrate their own knowledge, techniques and professional skills; and comprehend the company culture or etiquette rules. Through the course, students could make more connections with people in the same professional field, gain insight into a career path for their future job, and build their professional manners and attitude to adapt in the business and industrial environment.

CS405 - Open Economy, Entrepreneurship & Education

- Tên tiếng Việt **Kinh tế mở, khởi nghiệp và giáo dục**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The course is divided in 2 phases. Phase will be course work introducing different mechanisms of OpEEE (e.g. sharing economy, collaborative models, open source, Do It Yourself / Makers approaches, open science & research, empowering innovations) & practical tools to efficiently conduct projects. A strong emphasis will be put on digital tools

and networking skills during all the class. Students will also have a chance to meet with players active in this new economy.

Phase 2 will be dedicated to field work. Subjects will be co-defined with host companies / organizations. Students, then in group of 3-4 people, will apply the different mechanisms of OpEEE in order to initiate the very first concepts. Interactions with different players (companies, communities of end users, stakeholders) in related ecosystems will be crucial to iterate & validate the final concept. A prototype is highly recommended in order to have a concrete result but it is not obligatory.

CS407 - Technology-based Innovation and Leadership

- Tên tiếng Việt: **Đổi mới công nghệ**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The course is designed to provide students with a basic understanding of the innovators' mindset and provide students the opportunity to self-develop behaviors correlated with disruptive innovators. Skills to be developed – through coaching on assignments and in-class exercises – include observation of status-quos, idea generation by associating known solutions to solve status-quos or through lateral thinking; networking with people to identify technological contributions, optimizing creativity, seeking feedback, and prototyping or mockup design. The side impacts of this course include development of out-of-the-box thinking, with imagination in an original manner to all problems identified through careful observation of status-quos. Innovation means transformation of technology into values and in the course, students have the opportunity to test their imagination about new generations of products (devices, software, tools, apps) or methods/procedures and estimate the impacts of their innovations to life.

CS408 - Computational Finance

- Tên tiếng Việt: **Tính toán tài chính**
- Số tín chỉ: **4**

Mô tả vắn tắt:

In this course, we will present the principles of computational finance and financial data analysis, focusing on research problems of algorithmic interest, including online algorithms, short-term trading strategies, technical analysis, etc.

CS409 - Enterpreneurship

- Tên tiếng Việt: **Sáng nghiệp Công nghệ thông tin**
- Số tín chỉ: **4**

Mô tả vắn tắt:

This course will help you answer the following questions:

- What is entrepreneurship?

- What knowledge, skills, and abilities are important in starting a new venture?

- How can I become a successful IT entrepreneur now or in the future?

CS411 - Computer Graphics

- Tên tiếng Việt: **Đồ họa máy tính**
- Số tín chỉ: **4**

Mô tả vắn tắt:

This class will introduce about concepts, structures, and programming techniques for display of 2D and 3D objects. It will include drawing algorithms (line, circle), rasterization (triangle and polygon), 2D geometrical transformation, 3D geometrical transformations, 3D projections (orthographic and perspective), surface shading, 2D and 3D clipping, and ray tracing. OpenGL will be the main toolbox for experiments.

CS412 - Computer Vision

- Tên tiếng Việt: **Thị giác máy tính**
- Số tín chỉ: **4**

Mô tả vắn tắt:

This course will provide knowledge about how to define and detect the features of image and video. Some basic problems of computer vision will be explained in this course such as image segmentation, object detection, object tracking, object recognition, stereo matching, etc. This course will also provide a skill of computer programming using OpenCV through the final project.

CS414 - Machine Learning

- Tên tiếng Việt: **Học máy**
- Số tín chỉ: **4**

Mô tả vắn tắt:

This course provides a broad introduction to techniques for building computer systems that learn from experience; conceptual grounding and practical experience with several learning systems; and grounding for advanced study in statistical learning methods, and for work with adaptive technologies used in speech and image processing, robotic planning and control, diagnostic systems, complex system modeling, and iterative optimization. Students gain practical experience implementing and evaluating systems applied to pattern recognition, prediction, and optimization problems.

CS415 - Optimization Methods

- Tên tiếng Việt: **Các phương pháp tối ưu hóa**
- Số tín chỉ:

Mô tả vắn tắt:

This course introduces the principal algorithms for linear, network, discrete, nonlinear, dynamic optimization and optimal control. Emphasis is on methodology and the underlying mathematical structures. Topics include the simplex method, network flow methods, branch and bound and cutting plane methods for discrete optimization, optimality conditions for nonlinear optimization, interior point methods for convex optimization, Newton's method, heuristic methods, and dynamic programming and optimal control methods.

CS416 - Data Modeling and Integration

- Tên tiếng Việt: **Tích hợp và mô hình hóa dữ liệu**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The course is an advanced course (at the end of Bachelor, or begin of Master studies) in Information Modeling, Modeling Methodology, and Model Based Information Integration. Modeling as well classical databases and information systems as well as highly

heterogeneous distributed information systems, in conjunction with dynamic (processes and behavior) modeling approaches for these classes of information systems.

The foundations of modeling languages as well in formal semantics as also using metamodelling approaches will be treated in detail. The given languages and our (meta-) modeling methodology will be applied to practical examples of model-based integration of software and data components for heterogeneous distributed information systems (HDIS) in several business domains.

Therefore, this course covers all aspects of 'model management' starting from model building and modeling, via the formal foundations of modeling and metamodeling, via model transformations and model integration (matching/merging), the persistent storage of (meta-) models in model repositories to, finally, the handling of consistency and evolution of models and metamodels.

CS417 - Game Theory, Multi-Agents and Social Algorithms

- Tên tiếng Việt: **Lý thuyết game, các thuật toán đa tác nhân và xã hội**
- Số tín chỉ: **4**

Mô tả vắn tắt:

There has been an explosive growth of online communities in recent years. These communities involve millions of users and span a wide range of media and platforms from instant messaging, to blogging and social networking. This leads to complex and intricate interactions between users in these communities. The course aims at giving you an introduction to some of the fields that might shed light on how certain behaviors or phenomena arise in these highly connected systems. Specifically, we will cover various topics in game theory, multi-agent systems, and social algorithms with sufficient depth to tackle challenging technical problems. However the main goal is for you to find an area that piques your interest to further pursue it.

CS418 - Introduction to Natural Language Processing

- Tên tiếng Việt: **Nhập môn xử lý ngôn ngữ tự nhiên**
- Số tín chỉ: **4**

Mô tả vắn tắt:

Natural language processing (NLP) deals with computational methods to convert text or speech data (unstructured data) into structured data. NLP is considered a branch of artificial intelligence. Typical applications of NLP are: text classification, text summarization,

machine translation, infomation retrieval, question answering. This course introduces basic concepts and techniques for processing text, and two NLP applications: spelling-error correction and text classification.

CS419 - Introduction to Information Retrieval

- Tên tiếng Việt: **Nhập môn Truy vấn thông tin**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The course is designed to provide students:

Basic knowledge of Information Retrieval, Visual Information Retrieval.

The course includes core parts such as information representation, information organization, information retrieval models, evaluate performance of information retrieval system.

CS420 - Artificial Intelligence

- Tên tiếng Việt: **Trí tuệ nhân tạo**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The course is designed to provided students guides to fundamental problems in AI, including solving problems by searching, representing knowledge and reasoning, building intelligent entities through machine learning. When problems can be formulated as search problems, general-purpose search strategies are employed in terms of uninformed search or informed search (i.e. with/without further information during the search). Special search problems, such as adversarial search and constraint satisfaction problem, are also introduced for comprehension. Generic representation of knowledge in intelligent systems is usually required because computers cannot fully grasp the semantic of natural languages. Propositional and first-order logic are helpful means for such purpose. Student are guided to use notions of these logics and apply basic inference processes for small world problems. Finally, a rational agent could not be practical without the ability of improving their skills through experience. Basic machine learning concepts as well as conventional approaches to achieve such goal are introduced in this part. During the course, students are going to study fundamental terms and concepts in AI so as to use them in appropriate contexts. They are also asked to improve their problem-solving and programming skills by completing the requirements of assignments and labs.

CS421 - Software Requirement

- Tên tiếng Việt: **Quản lý yêu cầu phần mềm**
- Số tín chỉ: **4**

Mô tả vắn tắt:

This course introduces the methods and techniques that support collecting, identifying, analyzing, specifying, testing, and managing (software) requirements. The content of this course focuses on introducing and guiding students to implement the process of analyzing and managing requirements with a specific methodology (currently RUP).

CS422 - Software Analysis and Design

- Tên tiếng Việt: **Phân tích và thiết kế phần mềm**
- Số tín chỉ: **4**

Mô tả vắn tắt:

This course introduces the common principles to analyze and design software from software requirements. The content of this course focuses on object oriented techniques (using UML) to analyze, to design architecture, interface, business logic, and data. Several advanced topics can be optionally introduced (e.g. design patterns, service oriented architecture…).

CS423 - Software Testing

- Tên tiếng Việt: **Kiểm thử phần mềm**
- Số tín chỉ: **4**

Mô tả vắn tắt:

This course is for professionals and students who wish to gain a better understanding of software testing techniques and/or specialize in software quality engineering. The course will cover selected techniques for black box and white box testing, testing tools, and process and management issues. The seminar will be a blend of software testing concepts and theories with practical hands-on experience…

CS424 - Web Application Development

- Tên tiếng Việt: **Phát triển ứng dụng Web**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The course provides knowledge and techniques to students in developing web applications. Students will be presented the web and internet overview, client-server model of the web applications as well as the detail steps in building a website. The course also presents the client-side and server-side technologies in developing web applications, the issues of and solutions to web security, the basic techniques and the tools in testing the web applications.

CS426 - Mobile Device Application Development

- Tên tiếng Việt: **Phát triển ứng dụng trên thiết bị di động**
- Số tín chỉ: **4**

Mô tả vắn tắt:

This course aims to provide students with an overview of the field of Mobile Device Application Development and the background knowledge related to key components in the area of Mobile Device Application Development (platforms, environments & tools, specific design, libraries to support development, testing and deployment of mobile applications). The main topics in the course include: user interface design; application lifecycle management; data storage & access; multi-thread processing; data sharing between applications; manage background services; communication between processes; develop web services; develop map & GPS services; develop telecommunication functions related to calls & messages, graphics, animation, multimedia, performance management, and security. The mobile platform illustrated in the subject will vary according to technology trends in Vietnam and the world. The course content is currently illustrated based on Android environment.

CS427 - 3D Visualization and Game Development

- Tên tiếng Việt: **Trực quan hóa 3D và phát triển game**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The content of this course includes architecture and main components of a game and game-related applications, such as generate and render 3D scenes, create visual environmental effects with vertex shaders and pixel shaders. This course also provides students with basic to advanced techniques in data visualization of multivariate and high dimensional data.

CS428 - Electronic Commerce

- Tên tiếng Việt: **Thương mại điện tử**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The course briefly looks at topics such as fundamentals of electronic commerce (EC), online business models, EC infrastructures and softwares, electronic payments, internet marketing and advertising strategies, and web technologies.

CS429 - Mining on Big Data

- Tên tiếng Việt: **Khai thác trên dữ liệu lớn**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The course discusses techniques/algorithms in data mining and machine learning to analyze very large amounts of data. The emphasis will be on Map/Reduce programing model for creating parallel algorithms that can process big data. This course also provides students a practical understanding of the tools in the Apache's Spark system.

CS430 - Human-Computer Interaction

- Tên tiếng Việt: **Tương tác người - máy**
- Số tín chỉ: **4**

Mô tả vắn tắt:

- Why do people love iPhone?

- Why do people keep using Facebook?

'- How did Instagram become a $4B company?

- Why do users of your website complain even when you spent 12 months working on it?

It turns out that there is the same answer to those questions. The successful companies know that they need to delight users with their products. Not frustrating them. They know the right Human-Computer Interaction principles, processes, and techniques to apply. Not being ignorant of them. If you miss this course, you'll miss out on how to efficiently come up with product ideas, to rapidly prototype multiple alternatives, to design beautiful interfaces, and to verify whether users like them. Among other things! If you want to build difficult-to-use, ugly and ineffective products/interfaces, don't come to this course.

CS431 - Wireless Network

- Tên tiếng Việt: **Mạng không dây**
- Số tín chỉ: **4**

Mô tả vắn tắt:

This course provides a comprehensive treatment of wireless data and telecommunication networks. Topics include recent trends in wireless and mobile networking, wireless coding and modulation, wireless signal propagation, IEEE 802.11a/b/g/n/ac wireless local area networks, 60 GHz millimeter wave gigabit wireless networks, vehicular wireless networks, white spaces, IEEE 802.22 regional area networks, Bluetooth and Bluetooth Smart, wireless personal area networks, wireless protocols for Internet of Things, ZigBee, cellular networks: 1G/2G/3G, LTE, LTE-Advanced, and 5G financial industry is a tremendous consumer of advanced computing technologies and mathematical modeling techniques, and a primary employer of computer science graduates in the New York metropolitan area. In this course, we will present the principles of computational finance and financial data analysis, focusing on research problems of algorithmic interest.

CS432 - Cryptography

- Tên tiếng Việt: **Mã hóa**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The goal of cryptography is the encoding of information via a cryptographic system. Cryptanalysis studies the breaking of cryptosystems. This course focuses on cryptography but with respect to cryptanalysis. An overview of classical systems with an in-depth examination of modern cryptosystems. This includes block algorithms such as DES; public-key cryptosystems, such as RSA; and one-way functions. Additional topics include

cryptographic protocols, signature schemes, pseudo-random number generation, Shannon's information theory, and stream ciphers.

CS433 - Network Security

- Tên tiếng Việt: **An toàn mạng**
- Số tín chỉ: **4**

Mô tả vắn tắt:

This is an advanced study of network security. Topics include historical and recent network-based attacks including denial of service attacks, a study of network security monitoring procedures including anomaly and signature-based detection, firewalls, and an in-depth study of defensive techniques at various layers of the ISO stack, including modern cryptographic protocols like IPSEC, SSL, and other application-layer security protocols.

CS434 - Computer Security

- Tên tiếng Việt: **An ninh máy tính**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The course is roughly divided in two separate parts. The first provides a broad introduction to cryptography and communication security mechanisms based on cryptography. The first part covers fundamental aspects such as security evaluation criteria and the mathematical constructs (briefly) underlying cryptographic primitives as well as applied aspects like the design of major encryption and hashing algorithms, details of security mechanisms relying on cryptography such as data encryption, integrity, digital signature, authentication, key management, and public-key infrastructures.

The second part of the course deals with introducing to practical security concepts. The goal is to understand common attacks and countermeasures in a range of topics: Windows and Unix Security Basics, Race Conditions, Memory Corruption, Digital Forensics, Web Security, Wireless Security, Network Security, Malware, Mobile Security. The part is practice oriented, it describes real attacks and countermeasures. Students will practice attacks on a dedicated server (similar to a Capture the Flag competition).

CS469, CS470 - Capstone Project I, II

- Tên tiếng Việt: **Đồ án tốt nghiệp I, II**
- Số tín chỉ: **5+5**

Mô tả vắn tắt:

Emphasizes teamwork in small groups on a substantial project that will be performed for a real customer. Projects are chosen so as to provide interdisciplinary content with project proposals being solicited from the community at large. Projects that involve students as well as customers from other disciplines are encouraged. Lectures will be directed towards the management of software development projects such as those being carried out by the teams. It is the intent of the course to provide a capstone experience that integrates the material contained in the remainder of the CS curriculum through work on a project that applies this material in another discipline. Each team member will contribute to the design, documentation, and testing phases of the project.

CS486 - Introduction to Database Systems

- Tên tiếng Việt: **Nhập môn các hệ cơ sở dữ liệu**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The course introduces the overview of the needs for databases in enterprises, as well as other organizations. The course will provide the background knowledge of database systems on where the relational model is emphasized. Moreover, the techniques, tools and skills are provided for students to design, manipulate, and exploit the database via a relational database management system. The course also mentions future trends in database systems research.

CS494 - Internetworking Protocols

- Tên tiếng Việt: **Các giao thức liên mạng**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The course is designed to provide students the fundamentals of computer networking, the operation of the protocols in the TCP/IP suite, Internet, LANs, packet-switching networks, network architecture. Using the Internet as a vehicle, this course introduces the underlying

concepts and principles of modern computer networks, with emphasis on protocols, architectures, and implementation issues. Topics include network applications (email, ftp, http, dns, etc.), Internet in a top-down fashion: Application, Transport, Network, Data Link and Physical layers. The course will also cover some advance topics including network security and wireless networking.

ECE341 - Introduction to Computer Hardware

- Tên tiếng Việt: **Phần cứng máy tính**
- Số tín chỉ: **4**

Mô tả vắn tắt:

This course presents an overview of computer architecture and programming from a hardware viewpoint. Topics covered in the class include: digital logic gates, multiplexers, flip-flops, state machines; computer arithmetic operations; basic computer architecture - data path, control, and buses; pipelining- HW and CISC vs. RISC; memory hierarchy and virtual memory; input/output techniques - polling, interrupt, DMA; hardware view of computer system components - keyboard, mouse, displays, printers, disks, modems, and LANs.

CM101 - Communication Management

- Tên tiếng Việt: **Kỹ năng giao tiếp**
- Số tín chỉ: **4**

Mô tả vắn tắt:

This course is designed to improve communication abilities of freshman students in the Advanced Program in Computer Science.

SC203 - Scientific Method

- Tên tiếng Việt: **Phương pháp khoa học**
- Số tín chỉ: **4**

Mô tả vắn tắt:

This course is designed to provide students skills to define an experimental project, invest on their capabilities to observe, develop a hypothesis, state project objective(s) and success

criteria. Through lectures and practical in-class exercises aiming at developing scientific aptitudes, students are exposed to relevant methods, processes, and techniques for:

- Reading and Analyzing scientific articles,

- Raising a Hypothesis that reflects a Question to be answered,

- Designing the experiments to test the raised hypothesis,

- Implementing the experimentation,

- Executing the tests and Analyzing the obtained data,

- Documenting the obtained results.

WR227 - Technical Writing

- Tên tiếng Việt: **Kỹ năng viết tài liệu khoa học**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The course is designed to provide students skills to write technical documents with particular emphasis on academic papers. The students are first introduced to the principles of readers analysis and the general process of composing a technical document, so that they are able to aware of the mission and importance of technical writing. Students then go through primary parts of an academic paper to recognize how to collect appropriate information and where to put these pieces of data while pursuing a coherent idea. Tips for good style and rules of writing ethically are also discussed. These skills ensure the standard quality for the paper that students write now and in the future. Students are required to diligently improve their technical writing abilities through a series of personal/group assignments.

MTH251 - Calculus I

- Tên tiếng Việt: **Vi tích phân I**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The course is designed to provide students with the fundamental ideas of the differential and integral calculus on functions of one variable.

MTH252 - Calculus II

- Tên tiếng Việt: **Vi tích phân II**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The course is designed to provide students with the fundamental ideas of Improper Integrals & Applications, Differential Equations and Infinite Sequences and Series.

MTH253 - Calculus III

- Tên tiếng Việt: **Vi tích phân III**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The course is designed to equip the students with the concepts, techniques, and applications of calculus of several variables, including partial differentiation, multiple integration, vector calculus.

MTH261 - Introduction to Linear Algebra

- Tên tiếng Việt: **Đại số tuyến tính**
- Số tín chỉ: **4**

Mô tả vắn tắt:

On successful completion of this course, students will be equipped with an introduction to the topic of Linear Algebra and its applications, namely: systems of linear equations, matrices and determinants, vector spaces and linear transformations. An introductory treatment of inner products and eigenvalues, eigenvectors is also considered.

MTH344 - Group Theory

- Tên tiếng Việt: **Lý thuyết nhóm**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The course aims to provide students with basic notions of group theory and its applications. After giving the basic definitions for groups, we introduce fundamental properties of

groups: homomorphisms, normal subgroups and factor groups, cyclic groups, permutation groups. Especially, some important applications of groups to number theory, computer science, and other domains will be presented.

MTH346 - Number Theory

- Tên tiếng Việt: **Lý thuyết số**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The aim of this course is to provide students specialized in computer science basic knowledge on number theory. We start from basic notions, such as divisibility and primality, congruences and finish with some practical problems of algorithmic number theory: finding generators and discrete logarithms in Zp*, computing squares roots, primality tests. The theory will be provided in algebraic form with an emphasis on algorithms and applications.

PH211 - General Physics I

- Tên tiếng Việt: **Vật lý Đại cương I**
- Số tín chỉ: **4**

Mô tả vắn tắt:

This course covers the basic concepts of Motion along a Line, Motion in a Plane, Force and Newton's Laws of Motion, Circular Motion, Conservation of Energy, Linear Momentum, Torque and Angular Momentum, Fluids, Elasticity and Oscillations, Waves, Sound, Temperature and the Ideal Gas, Heat, Thermodynamics.

PH212 - General Physics II

- Tên tiếng Việt: **Vật lý Đại cương II**
- Số tín chỉ: **4**

Mô tả vắn tắt:

This course is the second course of introductory physics. The course helps students understand the basic phenomena of electricity and magnetism by introducing the concepts of electromagnetic fields and forces. In addition, the course discusses elements of

circuits with selected applications, Maxwell's equations, and electromagnetic waves. Students are instructed to develop better intuition about, and conceptual models of, physical phenomena in electricity and magnetism.

PH213 - General Physics III

- Tên tiếng Việt: **Vật lý Đại cương III**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The course covers the fundamental ideas of geometrical and wave optics and of modern physics (relativity, quantum, atomic and nuclear physics). It thus gives an understanding of the nature and behaviors of light, electrons and atoms, which are fundamental to a wide range of modern technologies. Tracing the historical development of optics and modern physics, it explains why relativity and quantum mechanics are needed, the key equations and concepts, and their use in diverse fields from telecommunications to nuclear power.

STAT451 - Applied Statistics for Engineers and Scientists I

- Tên tiếng Việt: **Thống kê ứng dụng dành cho kỹ sư và nhà khoa học I**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The course is designed to provide students statistical analysis emphasizing engineering applications. Topics include descriptive statistics, probability, sampling distributions, estimation, hypothesis testing, regression, quality control, and reliability.

STAT452 - Applied Statistics for Engineers and Scientists II

- Tên tiếng Việt: **Thống kê ứng dụng dành cho kỹ sư và nhà khoa học II**
- Số tín chỉ: **4**

Mô tả vắn tắt:

The course introduce the concepts and models of probability and statistics for dealing with the meanings and variability in observed data. In details, it provides knowledge of statistical analysis in terms of inference statistics: estimations, hypothesis testing, regression models.

BAA00003 - Ho Chi Minh's Ideology

- Tên tiếng Việt: **Tư tưởng Hồ Chí Minh**
- Số tín chỉ: **2**

Mô tả vắn tắt:

Môn học trang bị cho sinh viên những kiến thức cơ bản về: Đối tượng, phương pháp nghiên cứu và ý nghĩa học tập môn Tư tưởng Hồ Chí Minh; về cơ sở, quá trình hình thành và phát triển Tư tưởng Hồ Chí Minh, về độc lập dân chủ và chủ nghĩa xã hội, về Đảng Cộng sản và nhà nước Việt Nam; về đại đoàn kết dân tộc và đoàn kết quốc tế; về văn hóa, đạo đức, con người.

BAA00004 - Introduction to Laws

- Tên tiếng Việt: **Pháp luật đại cương**
- Số tín chỉ: **3**

Mô tả vắn tắt:

Sau khi kết thúc môn học sinh viên phải biết và hiểu được các khái niệm, thuật ngữ pháp lý cơ bản liên quan đến Nhà nước và pháp luật; Biết và hiểu về bộ máy nhà nước và các lĩnh vực pháp luật cơ bản, có thể vận dụng các quy định pháp luật để giải quyết một số bài tập tình huống đơn giản; Môn học cũng giúp sinh viên hình thành, phát triển một số kỹ năng cơ bản như tra cứu văn bản pháp luật, phân tích quy định pháp luật, làm việc nhóm, qua đó nâng cao ý thức sống, học tập, làm việc theo quy định của Hiến pháp và Pháp luật, định hướng hành vi ứng xử đúng trong cuộc sống.

BAA00021, BAA00022 - Physical Education 1, 2

- Tên tiếng Việt: **Giáo dục thể chất 1, 2**
- Số tín chỉ: **2 + 2**

Mô tả vắn tắt:

Môn học này giúp cho sinh viên có những kiến thức cơ bản về lợi ích, vai trò của việc tập luyện TDTT, cũng như có khả năng vận dụng những tri thức và kỹ năng vận động vào việc tự tập luyện hàng ngày để giữ gìn và nâng cao sức khỏe, phòng chống bệnh tật cho bản thân.

BAA00101 - Philosophy of Marxism and Leninism

- Tên tiếng Việt: **Triết học Mác-Lênin**
- Số tín chỉ: **3**

Mô tả vắn tắt:

Môn học này nhằm cung cấp cho sinh viên những quan điểm về chủ nghĩa duy vật biện chứng, phép biện chứng duy vật và chủ nghĩa duy vật lịch sử. Dưới sự trình bày một cách khái quát những nguyên lý, những quy luật cơ bản nhất của sự tồn tại, vận động và phát triển của tự nhiên, xã hội và tư duy.

BAA00102 - Political economics of Marxism and Leninism

- Tên tiếng Việt: **Kinh tế chính trị Mác-Lênin**
- Số tín chỉ: **2**

Mô tả vắn tắt:

Nội dung chương trình gồm 6 chương: Trong đó chương 1 bàn về đối tượng, phương pháp nghiên cứu và chức năng của Kinh tế chính trị Mác- Lenin. Từ chương 2 đến chương 6 trình bày nội dung cốt lõi của Kinh tế chính trị Mác - Lê nin theo mục tiêu của môn học. Cụ thể các vấn đề như: Hàng hóa, thị trường và vai trò của các chủ thể trong nền kinh tế thị trường; Sản xuất giá trị thặng dư trong nền kinh tế thị trường; Cạnh tranh và độc quyền trong nền kinh tế thị trường; Kinh tế thị trường định hướng xã hội chủ nghĩa và các quan hệ lợi ích kinh tế ở Việt Nam; Công nghiệp hóa, hiện đại hóa và hội nhập kinh tế quốc tế ở Việt Nam.

BAA00103 - Scientific Socialism

- Tên tiếng Việt: **Chủ nghĩa xã hội khoa học**
- Số tín chỉ: **2**

Mô tả vắn tắt:

Chương trình học phần Chủ nghĩa xã hội khoa học được chia thành 7 chương, chương 1 trình bày những vấn đề cơ bản có tính nhập môn của CNXHKH (quá trình hình thành, phát triển của CNXHKH), từ chương 2 đến chương 7 trình bày những nội dung cơ bản của CNXHKH. Cụ thể chương 2, trình bày về nội dung sứ mệnh lịch sử giai cấp công nhân nói

chung và giai cấp công nhân ở Việt Nam nói riêng, biểu hiện, ý nghĩa của sứ mệnh lịch sử đó trong bối cảnh hiện nay. Chương 3, trình bày những quan điểm cơ bản của chủ nghĩa Mác – Lênin về chủ nghĩa xã hội, thời kỳ quá độ lên chủ nghĩa xã hội và sự vận dụng sáng tạo của Đảng Cộng sản Việt Nam vào điều kiện cụ thể Việt Nam. Chương 4, trình bày nội dung, bản chất của nền dân chủ xã hội chủ nghĩa và nhà nước xã hội chủ nghĩa nói chung cũng như ở Việt Nam nói riêng. Chương 5, trình bày những kiến thức nền tảng về cơ cấu xã hội - giai cấp và liên minh giai cấp, tầng lớp trong thời kỳ quá độ lên chủ nghĩa xã hội; vị trí, vai trò của những giai cấp, tầng lớp cơ bản trong quá trình xây dựng đất nước và nội dung của liên minh giai cấp, tầng lớp trong thời kỳ quá độ lên chủ nghĩa xã hội ở Việt Nam. Chương 6, trình bày những quan điểm cơ bản chủ nghĩa Mác-Lênin về vấn đề dân tộc, tôn giáo và những nội dung cơ bản của chính sách dân tộc, tôn giáo của Đảng và Nhà nước ta. Chương 7, trình bày những quan điểm cơ bản của chủ nghĩa Mác - Lênin, tư tưởng Hồ Chí Minh và Đảng Cộng sản Việt Nam về gia đình, xây dựng gia đình trong thời kỳ quá độ lên chủ nghĩa xã hội, xây dựng gia đình ở Việt Nam hiện nay.

BAA00104 - History of Vietnamese Communist party

- Tên tiếng Việt: **Lịch sử Đảng cộng sản Việt Nam**
- Số tín chỉ: **2**

Mô tả vắn tắt:

Môn học trang bị cho sinh viên những kiến thức cơ bản về Lịch sử Đảng Cộng sản Việt Nam.