

Catalog Description

Basic Engineering

200-111 Into Engineering World

2((2)-0-4)

Evolution of engineering disciplines; engineering professional organizations; engineering career path; engineering ethics; engineering problems; systematic problem analysis and solving; teamwork; presentation techniques

200-112 Fundamental Mathematics for Engineer

3((3)-0-6)

Mathematics in engineering; mathematical induction; functions and graphs; limit and continuity; derivatives of functions and applications in engineering; integration of functions and applications in engineering

200-113 Fundamental Physics for Engineer

3((3)-0-6)

Physics in engineering; units, physical quantities, and vectors; force system and motions; work and moment; particles and rigid bodies; energy and momentum

200-114 Chemistry for engineer

2((2)-0-4)

Chemical in daily life and safety; physical properties of solid, fluid and gas; gas law; law of mass and stoichiometry; reaction and equilibrium; acid-base; electrochemistry; thermodynamics

200-115 Basic Electrical Engineering

3((2)-2-5)

Electrostatics; magnetism; DC circuit analysis; voltage, current and power; basic electrical components; Ohm's law and Kirchhoff's law; AC circuit analysis; real and reactive power; power factor; power factor correction; single-phase electricity bill; three-phase systems; transformers; introduction to electric machinery; electric generators and motors; introduction to electrical instruments

200-116 Basic Engineering Programming

3((2)-2-5)

Computer concepts; computer components; hardware and software interaction; electronic data processing concepts; high-level language programming concepts; program design and development methodology; data types; constant; operations and expression; statement and compound statement; flow controls; sequence; alteration

and iteration; debugging; program design and development with applications to engineering problems using a high level programming language; programming practices

200-117 Basic Engineering Drawing

2((2)-0-4)

The importance of engineering drawing; drawing instruments and their uses; lettering; line types and standards; applied geometry; pictorial drawing, oblique drawing, isometric drawings, orthographic drawing; freehand sketches; section drawing, dimensioning and descriptions in engineering drawing

240-001 Benefit of Mankinds

1((1)-0-2)

The integrative activities emphasizing; the philosophy of sufficiency economy; work principles; understanding and development of King's philosophy for the benefits of mankind

Computer Engineering

240-121 Basic Hardware Laboratory

1(0-2-1)

Hardware basic equipments; computer and mobile device components; computer and mobile device installation and maintenance

240-122 Basic Software Laboratory

1(0-2-1)

Software basic equipments; revision control usage; integrated development environment usage for computer program and mobile device applications; program development techniques; framework installation configuration and usages

240-123 Module: Data structure, algorithm and programming

6((3)-6-9)

Basic data structures, linked list, queues, stacks, binary tree, B-tree, Heap; algorithm analysis and algorithmic complexity; computing algorithms and problem-solving; algorithmic strategies; using APIs; programming paradigms; programming constructs; recursion; object-oriented programming; event-driven and concurrent programming; data modeling; analyze, design, test and evaluate computer-based systems; client-server computing and distributed algorithms; case study

240-124 Module: Web designer and developer Module**9((6)-6-15)**

Entrepreneurship concept; design thinking; ISO29110; web development technologies; algorithms and problem-solving; web architecture; basic algorithmic analysis; algorithmic strategies; distributed algorithms; computing algorithms; software engineering; introduction to software development process; software requirement and specifications; software design principle; the concept of software development project management; software testing and validation; database systems; performance evaluation; UI/UX; presentation techniques; security and privacy; negotiation technique; real case studies from medical or industrial business sectors

240-213 Discrete Mathematics**2((2)-0-4)**

Sets, relations, functions, theorem and proof; combinatorics; basic logic, propositional logic, predicate logic; recursive functions; automata and regular expressions; context free grammars

240-214 Data Communications and Networking**3((3)-0-6)**

Introduction to data communications, network models, physical layer, data and signals, compression and decompression, transmission impairment, data rate limits, performance evaluation, digital transmission, analog transmission, modulation, multiplexing, spread spectrum, transmission media, switching, data-link layer, error detection and correction, media access control, peer-to-peer protocols

240-216 Exploring software development and database technologies 1(0-2-1)

Hand-on laboratory to explore technologies related to software development including database usages approval granted by the curriculum management team in order for the students to know new technologies related to database and software development

240-218 Circuit and Basic electronic**4((4)-0-8)**

Quantities and units; definition and meaning of voltage, current, and resistance; current source; voltage source; Ohm's law; energy and power; Kirchhoff's laws; series circuit; parallel circuits; superposition theorem; Thevenin's theorem; Norton's theorem; circuit analysis using loop and node methods; introduction to alternating current circuits; characteristics of resistor, capacitor, and inductor; circuit impedance; analysis of RLC circuits; power in AC circuits; basic electronics, electronic properties of materials; diodes and diode circuits; MOS transistors and biasing, MOS logic families; bipolar transistors and logic families; operational amplifiers; circuit

modeling and simulation; data conversion circuits; electronic voltage and current sources; amplifier design; integrated circuit building blocks

240-219 Module: Network Administrator

9((6)-6-15)

Communications network architecture; communications network protocols; local and wide area networks; client-server computing; data security and integrity; wireless and mobile computing; performance evaluation; data communications; network management; compression and decompression; system administrator, virtual machine management, container/docker management, real case studies from medical or industrial business sectors

240-226 Advance software development and database technologies

1(0-2-1)

Hand-on laboratory to explore advance technologies related to software development including database usages approval granted by the curriculum management team in order for the students to know new technologies related to database and software development

240-228 Digital Logic and Microcontroller

3((3)-0-6)

Switching theory; combinational logic circuits; modular design of combinational circuits; memory elements; sequential logic circuits; digital systems design; modeling and simulation; formal verification; fault models and testing; design for testability data structures and algorithms; interfacing logic families and standard buses; fundamentals of computer architecture; interfacing and communication; hardware description language; computing; circuit modeling; design tools, tool flow and programmable logic platforms for implementing computing systems; computing circuit modeling

240-229 Module: Software defined architecture engineer

9((6)-6-15)

Operating system concept; design principles; concurrency; scheduling and dispatch; memory management; device management; security and protection; file systems; system performance evaluation; fundamentals of computer architecture; computer arithmetic; memory system organization and architecture; interfacing and communication; device subsystems; processor systems design; organization of the CPU; performance; performance enhancements; System requirements and specifications; system design; system integration; system testing and evaluation; distributed system models; distributed system models and enabling technologies; computer clusters for scalable computing; virtual machines and virtualization of clusters and datacenters; design of cloud computing platforms; cloud programming

and software environments; ubiquitous computing with clouds and the internet of things; real case studies from medical or industrial business sectors

240-300 Practical Training

at least 320 Hours

Students who have completed a minimum of 5 regular semesters have to spend at least 320 hours training in industrial enterprises, companies or academic institutes

240-306 Wireless and Mobile Networks

2((2)-0-4)

Introduction to wireless data transmission, wireless standards, radio frequency communications, wireless personal area networks, wireless local area networks, wireless metropolitan area networks, wireless wide area networks, cellular telephony networks, satellite transmissions, introduction to emerging wireless technologies wireless: and mobile computing

240-308 Computer Engineering Project Preparation

2(0-6-0)

Prerequisite : 240-123 and 240-228

Study of problems to be used as a project in computer engineering project I and II, researching information and conducting some preliminary experiments for the senior project, writing a project proposal including motivation, objectives, scope, related works, methodologies, expected results, and others related information; giving two oral presentations on the project proposal

240-309 Microcontroller and Interfacing

3((3)-0-6)

Introduction to microcontroller architecture, introduction to instruction set and assembly language, peripheral interfacing, serial communication, I2C, UART, SPI, low-level C programming technique, memory mapped I/O, polling, interrupt, DMA, timer, external interfacing ADC, DAC, flash memory and display, interfacing logic families and standard bus, and microcontroller applications

240-310 Algorithms: Design and Analysis

3((3)-0-6)

Overview of algorithms; algorithmic analysis principles, asymptotic analysis (including big-O), upper bound, lower bound, tight bound; algorithmic strategies: data structure-related algorithms, heap, b-tree, sorting, searching, hash table, graph, shortest-path algorithms; brute-force algorithm, greedy algorithm, divide-and-

conquer, dynamic programming, state space search, depth-first search, breadth-first search, backtracking; distributed algorithms; computing algorithms; introduction to algorithmic complexity; tractable and intractable problems; class P, class NP, NP-completeness; standard NP-complete problems

240-311 Distributed Computers and Web Technologies

3((3)-0-6)

Introduction to distributed computing, such as client/server and peer-to-peer computing; socket programming; workload distribution; remote procedure call; middleware; web technologies, server-side and client-side programming; web authentication and authorization; support tools for web creation and management

240-312 Computer Security

3((3)-0-6)

Principle of computer security; cryptography, public key, symmetric key; integrity, hash function; steganography; authentication, password, biometric; authorization, access control mechanisms; network security; malware, virus, worm; wireless security

240-316 Experiencing advance technologies in computer engineering

1(0-2-1)

Hand-on laboratory to experience advance technologies related to computer engineering field approval granted by the curriculum management team in order for the students to experience new advance technologies

240-318 Artificial Intelligence and Machine learning

3((3)-0-6)

Definition of Artificial Intelligence; problem solving by search; knowledge representation; natural language processing; introduction to evolutionary computation; machine learning; neural networks; deep learning

240-319 Module: Embedded system developer

9((6)-6-15)

Embedded systems technology; embedded system hardware; embedded system software; embedded microcontrollers; embedded programs; low-power computing; reliable system design; design and methodologies; network embedded systems; interfacing and mixed-signal systems; digital microelectronic circuit design; entrepreneurship; realtime system and programming; real case studies from agriculture, food and healthcare, and smart city sectors

240-322 Data Engineering**3((3)-0-6)**

Introduction to data engineering; data cleansing; data transformation; data integration; SQL and NoSQL; big data architecture; data streaming; data virtualization; data science concept; programming; case study

240-323 Elements of Continuous Software Development**3((3)-0-6)**

Introduction to continuous software development; introduction to software testing; best practices in coding; automatic workflow and tools; automated software testing; continuous integration; continuous delivery; infrastructure as a code; case study

240-327 Statistic for data analysis using R**2((2)-0-4)**

Set and probabilities theory; random variables; probability mass function; discrete random variables and probability distributions; continuous random variables and probability distributions; stochastic process; simple distribution; expectation; variance analysis; estimation theory; hypothesis tests; correlation and regression; R programming

240-328 Data Analytics and Data Science**2((2)-0-4)**

Introduction to fundamental concepts and theories to process structural data sets, data preparation, data analysis, extracting useful data to predict the analysis results, and data visualization

240-331 Module: Mobile Applications Developer**9((6)-6-15)**

Entrepreneurship concept; design thinking; agile-based methodology; web development technologies; algorithms and problem-solving; web architecture; basic algorithmic analysis; database query languages; algorithmic strategies; data modeling; computing algorithms; software requirements and specifications; distributed algorithms; software design; performance evaluation; software testing and validation; presentation techniques; software tools and environments; UI/UX; version control; security and privacy; track requirements and bugs; negotiation technique; automate building; using APIs; API development and architecture; microservices; analyze, design, test and evaluate computer-based systems; real case studies from medical or industrial business sectors

240-332 Module: Game Designer and Developer**9((6)-6-15)**

Game elements; platforms; player modes; goals; genres; player elements; game programming languages; game architecture; mathematical concepts; collision detection; animation; artificial intelligence; game design; game development; marketing and maintenance; software engineering; database system; various cutting-edge case studies; real case studies from medical or industrial business sectors

240-333 Module: Cross-Platform Web and Application Developer**9((6)-6-15)**

Multiplatform mobile app development with web technologies; identify, analyze user's requirements; digital mockups; cross-platform tools and technologies; cross-platform techniques for projects; cross-platform mobile apps from web codes; ISO/IEC 29110 standard activities for quality assurance; analyze, develop requirement specifications conforming to ISO/IEC 29110 standard; cross-platform app design; software engineering; database system; real case studies from medical or industrial business sectors

240-340 CMOS VLSI Design**3((3)-0-6)**

Introduction to CMOS VLSI design, MOS Transistor theory, CMOS processing technology, delay, logical effort, delay optimization, power, interconnect, robustness, circuit simulation, combination circuit design, sequential circuit design, design methodology and tools, testing

240-341 Embedded System Design**3((3)-0-6)**

History and overview of embedded systems; embedded microcontrollers; embedded programs; low-power computing; reliable system design; design and methodologies; network embedded systems; interfacing and mixed-signal systems

240-351 Module: Network Infrastructure Engineer**9((6)-6-15)**

Communications network architecture; communications network protocols; local and wide area networks; data security and integrity; network management; network components; application requirements with a network system; simulations; security and performance issue related to wireless networks; real case studies from medical or industrial business sectors

240-352 Module: High-performance Computing Engineer**9((6)-6-15)**

Event-driven and concurrent programming; distributed algorithms; distributed system models; algorithmic complexity; concurrency; scheduling and dispatch; system performance evaluation; file systems; performance measurement tools; distributed infrastructure; analyze, design, test, and evaluate computer-based system; parallel programming models; parallel and distributed architecture and programming; threads programming : POSIX thread and OpenMP; RPC/RMI and MPI; map-reduce programming model and distributed file system; message queue and deadlock management; scheduling and load balancing; advanced distributed algorithms; general-purpose computing on graphics processing units : GPGPU; vector processing and SIMD programming; large scalable architecture design; micro-service; cluster computing; fault tolerance computer system; real case studies from medical or industrial business sectors

240-353 Module: Cybersecurity Officer**9((6)-6-15)**

Cybersecurity technology; cybersecurity risk assessment and management; cybersecurity threats and defense; critical infrastructure control systems security; designing and securing cyber-physical systems; ethical hacking; malicious software analysis and defense; incident handling; system security; information security; ISO27000; security and privacy; vital organization practices; performance evaluation; presentation techniques; cryptography; network security; UNIX programming; real case studies from medical or industrial business sectors

240-360 Network Modeling and Performance Analysis**3((3)-0-6)**

Introduction to stochastic process; poisson process; birth-death process; Markov chains; queueing theory; performance analysis for queueing models; M/M/s queue, M/D/1 queue, M/G/1 queue

240-361 Network Protocols**3((3)-0-6)**

Introduction to network protocols, routing of IP packets, ARP/RARP, internet protocol (IP), ICMP, IGMP, UDP, TCP, SCTP, multicasting, DHCP, DNS, remote login, FTP, SMTP, POP and IMAP, SNMP, other related protocols

240-362 Cryptography and Blockchain**3((3)-0-6)**

Algebra, encryption technology, digital signatures, hashing, cryptocurrency, blockchain ecosystem, smart contracts, commercial use cases, case studies

240-371 Module: IoT System Developer**9((6)-6-15)**

IoT technology; IoT hardware; IoT software; energy efficiency; digital microelectronic circuit design; entrepreneurship; real case studies from agriculture, food and healthcare, and smart city sectors

240-372 Module: IoT Data Analyst**9((6)-6-15)**

IoT data collection management; data analysis theory; data storing and analyzing platform usage; entrepreneurship; real case studies from agriculture, food and healthcare, and smart city sectors

240-373 Module: Wearable and Low Power IoT device developer**9((6)-6-15)**

IoT device; device power usage; device data storing process; device prototype development; device development concept; device testing; entrepreneurship; real case studies from agriculture, food and healthcare, and smart city sectors

240-380 Signals and Image Processing**3((3)-0-6)**

Theories and principle of digital signal and image processing; acquisition; sampling and quantization; convolution; Fourier series; continuous and discrete Fourier transform; spatial filters; frequency filters; morphological image processing; image segmentation; shape representation and description; image recognition; image compression

240-381 Computer Control systems**3((3)-0-6)**

Mathematic modeling, time response, stability and steady state error, roots locus frequency response, design of PD, PID controller, Z-transform, data sampling time, difference equation, conversion of continuous time system to digital system, mathematic program usage, microcontroller programming and design of controller.

240-382 Signals and Systems**3((3)-0-6)**

Basic of signals, relation between input and output of systems, continuous - time and discrete-time convolution, properties of convolution, continuous-time and discrete-time Fourier series , time domain and frequency domain, continuous-time and discrete-time Fourier transform

240-391 Module: Artificial Intelligence and Robotic Control Engineer 9((6)-6-15)

Artificial Intelligence fundamental; deep learning; mobile robot; sensors in robot; controller PD PI PID; structure of robot control program; entrepreneurship concept; wireless networking; interfacing and communication; algorithms and problem-solving; signal processing; security and privacy; image processing; negotiation technique; sensors; presentation techniques; motor and basic control; real case studies from medical or industrial business sectors

240-392 Module: Modern Industrial Automation Engineer 9((6)-6-15)

Industrial process control; industrial process measurement; industrial control system; data communication and network; motion control and drive system; human machine interface (HMI); industrial Internet-of-Things; platforms and scalability; machine monitoring system; database systems; mobile applications; web applications; real case studies from medical or industrial business sectors

240-393 Module: Industrial Machine Vision Engineer 9((6)-6-15)

Basics of computer vision: Nature of images, Homogeneous transformations, Image acquisition, Geometrical and Optical image formation, Perspective projection, Camera technologies and Vision systems design. Basics of Image Processing: Filtering, Edge detection, Features detection, Contours, Segmentation, Morphological Operators. Calibration: Camera model, Intrinsic and extrinsic camera parameters, Camera calibration. Motion: Motion detection, Optical flow, Object tracking, Motion capture. Three-dimensional imaging: Epipolar geometry, Stereoscopic vision, Active range imaging, Structured lighting. Modeling and registration: Modeling techniques for autonomous systems, Data fusion, Uncertainty mapping, Registration, Pose estimation. Applications: Quality control, Visual feedback, Mapping and robot guidance, Activity monitoring, Motion estimation, Autonomous systems, Biomedical imaging devices; real case studies from medical or industrial business sectors

240-394 Module: Mobile Robot Developer 9((6)-6-15)

Mobile robot design principles; types of mobile robots; embedded systems for robots; robot operating system; actuators; sensors; robot controls; map creation; path planning; obstacle avoidance; robot learning; robot simulation; robot to robot communication; robot to base station communication; mobile robot applications; principles of drones, rescue robots, soccer robots, service robots and industrial robots; case studies from medical or industrial sectors

240-395 Stock Trading Robot Developer Module**9((6)-6-15)**

Stock market investment principles; Forex market investment principles; principles of trading using robots; robot software for investment usage; investment strategies; MQL for trading robot development; stock market data retrieval; machine learning development for stock market predictions; stock market and Forex market trading robot design and development; real case studies from the business sector.

240-401 Computer Engineering Project I**3(0-9-0)****Prerequisite : 240-121, 240-122 and 240-308**

Each student will perform a project in the fields of computer engineering spanning two semesters; the project should focus on design, development or research and experimentation; students must give an oral presentation on his/her progress periodically; although students are supervised by at least one supervisor, most of the time they should initiate project ideas and solve the problem by themselves

240-402 Computer Engineering Project II 2**3(0-9-0)****Prerequisite : 240-401**

Continuing of 240-401 for developing the project until finish; an oral presentation and demonstration of the project must be given; a final written report must be submitted

240-403 Cooperative Education Preparation**1((1)-0-2)****Prerequisite : 240-123 and 240-228**

Cooperative education preparatory session; review of literature related to the assigned research project; development of the project proposal; research planning and seminar; oral presentations

240-404 Cooperative Education**7(0-35-0)****Prerequisite : 240-403**

On the job training as a full-time staff of an approved workplace for a period not less than 16 weeks or 640 hours including oral presentation and final report submission to the entrepreneur

240-425 Data Mining and Applications**3((3)-0-6)**

Introduction to data mining; data property; data preprocessing; data dimension reduction methods; data analysis; decision trees; association rules; data classification; data clustering; knowledge discovery in database; evaluation techniques; applications of data mining

240-426 Advanced Algorithms**3(0-6-3)**

Some representative problems; graphs; greedy algorithms; divide and conquer; dynamic programming; geometric algorithms; NP and computational intractability; class of problems beyond NP; approximation algorithms; local search; randomized algorithms

240-440 Principles of Real Time Systems**3((3)-0-6)**

Principles of hardware and software design, hard real-time, critical safety policy; reliability and robustness embedded system; integrating principles of RTOS, interrupt service routine, multitasking, and scheduler algorithm

240-441 Multi-Core Programming and Architecture**3((3)-0-6)**

Introduction to multi-core architecture; concept of parallel programming; thread-level parallelism; design patterns for parallel programming; debugging parallel programs; performance analysis and optimization; development tool for parallel programming

240-447 High Performance Microprocessors**3((3)-0-6)**

Trends in technology; pipelined processor, vector processors; superscalar organization; out-of-order execution; speculative execution; explicitly parallel instruction computing; memory hierarchy design; advanced register dataflow techniques; cache organization; static and dynamic branch prediction; zero-cycle branching; multithreading and chip multiprocessors

240-460 Internet Programming**3((2)-2-5)**

Programming techniques; event-driven, state-based processing, protocol processing, modularity; distributed programming; web services, data structure server, subscriber and publisher, integration of social network; scalability; content-delivery network, load balancing, reverse proxy; real-time communication on web; service monitoring

240-480 Principle of Robotics**3((3)-0-6)**

Robotic evolution; social impact of technology robotic; principle of robotics; mechanical structure of robotics; mathematical model of robotics, vision, motion planning, mobile mechanisms; kinematics, inverse kinematics, algorithm and solutions, controls, data management; sensors; task planning; robot control programming techniques; case studies, construct robots driven by a microcontroller

240-486 Computer Vision Theory and Practice**3((3)-0-6)**

Concepts of computer vision; image creation, camera model and calibration; feature extraction and correspondence; motion detection; background subtraction, optical flow; tracking, Kalman filter, condensation filter; object recognition and classification, k-mean, Haar-like method; stereo vision, epipolar geometry, fundamental matrix; 3D reconstruction from multiple views; linear algebra, matrices, rank, products, eigen values and eigen vectors, singular value decomposition; optimization, least square method, gradient descent method

General Education

GE1: Royal Science and Benefits to Fellow Humans

001-102 The King's Philosophy and Sustainable Development 2((2)-0-4)

Meaning, principles, concept, importance and goal of the philosophy of sufficiency; work principles, understanding and development of the King's philosophy and sustainable development; an analysis of application of the King's philosophy in the area of interest including individual, business or community sectors in local and national level

388-100 Health for All 1((1)-0-2)

Principle and steps of basic life support, practice of basic life support in simulated situation; common mental health problems, warning signs, initial assessment and care; concepts of health and health promotion; first aid

240-001 Benefit of Mankinds 1((1)-0-2)

The Integrative activities emphasizing the philosophy of sufficiency economy, work principles, understanding and development of King's philosophy for the benefits of mankind

GE 2: Citizenship and Peaceful Life

895-001 Good Citizens 2((2)-0-4)

Role; duty and social responsibility as a citizen; social organization; law; right; liberty; equality; living together in a multicultural society

950-102 Happy and Peaceful Life 3((3)-0-6)

Consciousness and mindfulness; happiness; self-awareness; social literacy; understanding and respecting diversity; communication and collaboration skills; creative problem-solving; living in diversity

GE 3: Entrepreneurship

001-103 Idea to Entrepreneurship 1((1)-0-2)

Introduction to new entrepreneur creation; business environment analysis; survey for business opportunity analysis; using business models with modern business tools

GE 4: Living knowingly and digital literacy

GE 4.1 Living Knowingly

315-201 Life in the Future

2((2)-0-4)

Climate change in the future; biotechnology and nanotechnology; clean energy; information technology for living in the future; artificial intelligence

820-100 Save Earth Save Us

2((2)-0-4)

Concept for creative, sustainable, and environmental friendly living, survival, and adaptation in the changing environment, science and technology, and society including environmental awareness raising with up-to-date edutainment for young generation

200-103 Modern Life for Green Love

2((2)-0-4)

Current situation of world environment, natural resources for living; current pollution in community; current situation of water usage and impact from daily life; current situation of air pollution and solid waste; natural resources and pollution management

142-121 The Future Earth

2((2)-0-4)

Advancement in science; fast-growing technologies and their impacts on human life and modern society in 21st century; new energy, green energy, alternative energy; ecosystem and environment; global and social problems; drawbacks of the advancement

472-115 Survival 101

2((2)-0-4)

Understand and learn how to survival; how to handle the situation; survive in different situations such as natural disasters; earthquake; flooding and tsunami disaster; learn self-defensive to protect from crime; and apply the knowledge in daily life

GE 4.2 Digital Literacy

345-104 Digital Technology Literacy

2((2)-0-4)

Learn and utilize current technology and future trends in a secure and understandable way; practice the applications needed to work; uses of cloud computing applications for work effectively

200-107 Internet of Thing for Digital life

2((2)-0-4)

Introduction to modern computer technology; introduction to modern communication technology; smart internet usage; introduction to Internet of Things; introduction to program applications for 21st century skills

142-225 The 5th need

2((2)-0-4)

The importance and influence of social media in digital age; age groups of each generation and social media; social media applications; social media in digital age for education and educational entertainment; advantages and disadvantages of social media; computer crime act and information privacy

472-113 Black and White 2((2)-0-4)

Understand and know social media in digital age; creating benefit for society by using social media; understand the disadvantage from using social media

GE 5: Systematic thinking, Logical thinking and Numerical thinking

GE 5.1 Systematic thinking

315-202 Thinking and Reasoning

2((2)-0-4)

The definitions and importance of thinking and reasoning; brain thinking process; types of thinking; causality; reasoning; scientific and innovative thinking

895-011 Creative Thinking

2((2)-0-4)

Thoughts and happiness; cognitive styles; method of determining; happiness styles; positive thinking; happiness and education; happiness and relationships; applying thinking styles in living and working

895-012 Positive Thinking**2((2)-0-4)**

Positive thinking; examining one's own thought; life skills and aims of living

142-124 Creative Problem Solving**2((2)-0-4)**

Factors and causes of problem; understanding the problem; types of problems, problem solving steps; algorithm; thinking for decision making and algorithm; problem solving with algorithm; critical thinking and ideas; reliability and relevance; sources of information, understanding the sources of information, evidences, facts, validity and reliability

472-114 Creative Thinking**2((2)-0-4)**

Thinking out of the box and generate ideas; developing creativity thinking through brainstorming; mind mapping; reframing and role playing

GE 5.2 Logical and Numerical thinking**322-100 The Art of Computing****2((2)-0-4)**

Mathematics in surroundings; mathematical modeling for life; interest rate; annuity; collection and management data; introduction to data analysis and presentation

895-010 Thinking and Predictable Behavior**2((2)-0-4)**

Systematic thinking; problem solving; behavioral science; decision making; behavior prediction

142-129 Organic Thinking**2((2)-0-4)**

Analytical thinking; presumption and assumption; hypothesis; convergent and divergent thinking; data finding; problem and solution finding; predictions; logical; numerical analysis; relating and creating things; value adding

472-118 Pocket Money**2((2)-0-4)**

The importance of money saving; saving target; saving and spending plan to achieve target effectively; calculation of saving for emergency case

GE 6: Language and Communication**890-002 Everyday English****2((2)-0-4)**

Listening and reading in English on familiar, straightforward topics for main ideas and details; grammatical structures and expressions for everyday spoken and written communication

890-003 English on the Go**2((2)-0-4)**

English listening and reading on current topics for comprehension, summarization and interpretation; complex grammatical structures and expressions for everyday spoken and written communication in various contexts

890-004 English in the Digital World**2((2)-0-4)**

Listening and reading in English in the digital world; critically responding to listening and reading texts through speaking and writing

890-005 English for Academic Success**2((2)-0-4)**

English listening and reading in academic contexts; analyzing and responding critically to academic texts through speaking and writing

GE 7: Aesthetics and Sports

GE 7.1 Aesthetics

895-020 Thai Khim

1((1)-0-2)

Thai Khim; components of the Thai Khim; Thai Khim practice; playing Song Chan or moderate rhythm traditional Thai music with a Thai Khim

895-021 Singing, Playing, Dancing

1((1)-0-2)

Folk music; singing and folk musical instruments; Klong Yao Dance; Kieo Khao Song; Ten Kam Ram Khieo Song; Ngu Kin Hang Song

895-022 Rhythm and Song

1((1)-0-2)

Thai percussion instruments, Ranat Ek, Ranat Thum, Khong Wong; rhythm and percussion instruments, Klong Yao, Klong Khaek, Thon, Rammanna, Ching, Chap, Krap, Mong; playing basic traditional Thai music

895-023 Guitar

1((1)-0-2)

Basic guitar lessons; tone; sound quality; music scale; guitar melodies; popular music

895-024 Ukulele

1((1)-0-2)

Basic ukulele lessons; tone; sound quality; music scale; ukulele melodies; popular music

895-025 Harmonica

1((1)-0-2)

Basic harmonica lessons; tone; sound quality; music scale; harmonica melodies; popular music

895-026 Drama and Self-reflection

1((1)-0-2)

Aesthetics of the film and drama; food for thought; human identity; cultural reflection from the film and drama

895-027 Appreciation in Thai Language**1((1)-0-2)**

Linguistic features affecting thoughts, feelings, values and aesthetics expressing meanings as intended

895-028 Creative Drawing**1((1)-0-2)**

Drawing environments; sketching three dimensional images; drawing from imagination

340-162 The Aesthetic in Photography**1((1)-0-2)**

Light and shadow; Image composition; aesthetics in natural and environmental photography; aesthetics in human behavioral Imaging; aesthetics in photography for the arts; aesthetics in photography for communication

061-001 Aesthetics of Thai Dance**1((1)-0-2)**

General knowledge about Thai dance; costumes for Thai dance; songs for Thai dance; basic Thai dance movements; Thai dance performances

472-116 Local Arts and Fabric**1((1)-0-2)**

Learning, knowing value and appreciate the local arts; knowing the arts of reflecting life of local people through visiting and exchanging knowledge with the community leaders

142-234 Life is Beautiful**1((1)-0-2)**

Development of life aesthetics based on multicultural understanding; power of positive attitude; feeling and absorbing the beauty of life through arts, nature and other aesthetic creations; getting to know yourself and others through expressive art; stress release and relaxation through different types of arts; searching for inspiration and spirit; peaceful co-existence

142-135 Paper Craft**1((1)-0-2)**

Paper craft workshop, cutting, folding, creating artworks from paper

142-136 Sculpture**1((1)-0-2)**

Molding sculptures using various materials such as natural clay or Japanese clay; Learning how to manipulate these materials and use sculpting tools safely; Appreciating and Criticizing sculpture works through reading and discussion; Examining geometric, abstract and organic forms. Fundamentals of sculpture program

142-137 Everyone Can Draw**1((1)-0-2)**

Introduction to basic drawing and practice; sketching; basic drawing, light and shadow; human figures

142-138 The Sound of Musics**1((1)-0-2)**

Exploration of historical periods of both Eastern and Western art music; musical styles, musical elements, and composers and their works; basic musical concepts; develop music perception skills and representative musical compositions

142-139 Through The World of Art**1((1)-0-2)**

Art of Visual art, medium and technique in art creation

142-237 The Designers and Their Black Attires**1((1)-0-2)**

Evolution of design, fundamental of design, design process, design in relation to daily basis

GE 7.2 Sports**895-030 Swimming****1((1)-0-2)**

Body movements for swimming; swimming activities; application of swimming activities for health promotion and social skills in daily life

895-031 Tennis**1((1)-0-2)**

Body movement with tennis; activities tennis; the use of tennis as a medium to enhance the health and social skills needed in everyday life

895-032 Basketball**1((1)-0-2)**

Physical fitness; basic movements; basic techniques and skills in basketball; rules; etiquettes of players and spectators; improve the quality of life

895-033 Track and Field**1((1)-0-2)**

Body movements for track and field; track and field activities; application of track and field activities for health promotion and social skills in daily life

895-034 Social Dance**1((1)-0-2)**

Body movements for social dance; social dance activities; application of social dance activities for health promotion and social skills in daily life

895-035 Petanque**1((1)-0-2)**

Body movement with petanque; activities petanque; the use of petanque as a medium to enhance the health and social skills needed in everyday life

895-036 Camping**1((1)-0-2)**

Background; values of camping; conserving natural resources and camping; types of camping; camping activities; being good leaders and followers; rules; camping etiquettes; application of the skills

895-037 Badminton**1((1)-0-2)**

Body movements for badminton playing; badminton activities; application of badminton activities for health promotion and social skills in daily life

895-038 Table Tennis**1((1)-0-2)**

Body movement with table tennis; using table tennis as a medium for health promotion; application in daily life

895-039 Exercise for Health**1((1)-0-2)**

Objectives, values and benefits of physical exercise; physiology of exercise; physical fitness; criteria and formats of activities; selections of exercise model; application in daily life