



Bachelor of Industrial Technology

Program in Industrial Technology

(Amended Curriculum B.E. 2554)

Faculty of Technical Education

Rajamangala University of Technology Krungthep

Ministry of Education

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PREFACE

The Bachelor of Industrial Technology, Program in Industrial Technology (Amended Program B.E. 2554) is offered by the Department of Industrial Technology, Faculty of Technical Education. It aims to produce graduates whose knowledge and performances meet requirements of the industrial labor markets. The graduates will demonstrate a sense of virtue and morality, act as good citizens of the society, take responsibility for oneself, the profession and the society and uphold professional ethics.

The program provides information regarding the overall management to ensure target learning outcomes. Learners will be adept at both theory and practice. Employers can make decisions regarding recruiting graduates from this program. This program is in line with the Thai Qualifications Framework for Higher Education B.E. 2552

Faculty of Technical Education

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Bachelor of Industrial Technology
Program in Industrial Technology
(Amended Curriculum B.E. 2554)

Name of Institution Rajamangala University of Technology Krungthep

1. Faculty and Department Faculty of Technical Education
 Department of Industrial Technology

2. Name of Curriculum Bachelor of Industrial Technology
 Program in Industrial Technology

3. Name of Degree

3.1 Full Name in English : Bachelor of Industrial Technology (Industrial Technology)

3.2 Abbreviation in English : B.Ind.Tech. (Industrial Technology)

4. Objectives of the Curriculum

The program aims to produce graduates who demonstrate the qualities and knowledge.

4.1 An employee who can keep pace with change in technology and the labor market.

4.2 A person with consciousness and responsibilities for duties, the society and the homeland.

4.3 A person who is academically knowledgeable, equipped with intellectual skills and filled with creative ideas.

4.4 A person with a sense of virtue and morality, who maintains arts and cultures and upholds professional ethics.

5. Curriculum

5.1 Total Credits Requirement

136 Credits

5.2 Structure of Curriculum

The curriculum structure is classified into courses according to the standard guidelines of the Ministry of Education as follow.

1. General Education Courses

31 Credits

A. Social Sciences

3 Credits

B. Humanities

3 Credits

C. Languages

12 Credits

D. Sciences and Mathematics

12 Credits

E. Physical Education and Recreation

1 Credits

2. Specialization Courses

99 Credits

A. Professional Foundation

20 Credits

B. Major Required

54 Credits

C. Major Elective

18 Credits

D. Professional Experience

7 Credits

3. Free Elective Courses

6 Credits

5.3 Courses and Credits

1. General Education Courses

31 Credits

A. Social Sciences

3 Credits

Students may select from the following courses.

1-121-003 Human Relations 3(3-0-6)

1-122-003 The Philosophy of Sufficiency Economy 3(3-0-6)

1-123-004 Economics for Everyday Use 3(3-0-6)

1-124-002 Thai Politics and Government 3(3-0-6)

1-125-002 Labor Law 3(3-0-6)

1-125-003 Intellectual Properties Law 3(3-0-6)

Or another Social Sciences course in General Education courses offering by Rajamangala University of Technology Krungthep.

B. Humanities**3 Credits**

Students may select from the following courses.

1-130-001	Library and Information for Education	3(3-0-6)
1-130-002	Information Resources for Academic Presentation	3(3-0-6)
1-130-003	Information Retrieval Technique	3(3-0-6)
1-131-001	General Psychology	3(3-0-6)
1-131-002	Personality Development Techniques	3(3-0-6)
1-132-001	Man and Ethics of Living	3(3-0-6)
1-132-002	Buddhist Religion	3(3-0-6)
1-132-003	Religion and Way of Life	3(3-0-6)
1-133-001	Thai Studies	3(3-0-6)
1-133-002	Thai Culture	3(3-0-6)
1-134-001	Man and Arts	3(3-0-6)

Or another Humanities course in General Education courses offering by Rajamangala University of Technology Krungthep.

C. Languages**12 Credits**

Students may select from the following courses.

• Thai Languages**6 Credits**

1-110-101	Thai Usage	3(3-0-6)
1-110-102	Thai for Communication	3(3-0-6)
1-111-206	Speaking and Writing for Careers	3(3-0-6)
1-112-313	Creative Writing	3(3-0-6)

• English Languages**6 Credits**

1-211-001	General English	3(3-0-6)
1-211-002	English for Work	3(3-0-6)
1-211-003	English for Everyday Use	3(3-0-6)
1-211-004	English for Communication	3(3-0-6)
1-211-005	English Conversation	3(3-0-6)
1-211-006	General Reading	3(3-0-6)
1-211-007	General Writing	3(3-0-6)
1-211-008	English for Presentations	3(3-0-6)
1-211-009	English for Professional Purposes	3(3-0-6)

Or other Languages courses in General Education courses offering by Rajamangala University of Technology Krungthep.

D. Sciences and Mathematics 12 Credits

Students may select from the following courses.

2-110-104	Chemistry for Everyday Use	3(3-0-6)
2-110-107	Science and Technology for Local Wisdom	3(3-0-6)
2-120-102	Environment and Resources Management	3(3-0-6)
2-130-102	Science for Everyday Use	3(3-0-6)
2-130-103	Science and Technology	3(3-0-6)
2-210-001	Mathematics for Everyday Use	3(3-0-6)
2-210-002	Mathematics for Decision Making	3(3-0-6)
2-210-003	Mathematics for Cognitive Skill	3(3-0-6)
2-210-004	General Mathematics	3(3-0-6)
2-230-103	Introduction to Computer Assisted Instruction	3(2-2-5)
2-230-104	Internet Technology and Applications	3(2-2-5)
2-230-107	Package Program	3(2-2-5)

Or other Sciences and Mathematics courses in General Education courses offering by Rajamangala University of Technology Krungthep.

E. Physical Education and Recreation 1 Credit

Students may select from the following courses.

1-141-001	Physical Education	1(0-2-1)
1-141-002	Badminton	1(0-2-1)
1-141-003	Tennis	1(0-2-1)
1-141-005	Football	1(0-2-1)
1-141-011	Muay Thai	1(0-2-1)
1-141-013	Social Dance	1(0-2-1)

Or another Physical Education and Recreation course in General Education courses offering by Rajamangala University of Technology Krungthep.

2. Specialization Courses 99 Credits**A. Professional Foundation 20 Credits**

Students will be required to study the following courses.

3-001-301	Seminar	1(0-2-1)
3-001-302	Pre-Project	1(1-0-2)
3-001-403	Project	3(1-6-4)
3-111-104	Technical Drawing	3(2-3-5)
3-111-105	Engineering Skills	3(1-6-4)
3-111-106	Industrial Safety	3(3-0-6)
3-230-101	Electricity Technology	3(2-3-5)
3-230-102	Information and Communication Technology	3(1-4-4)

B. Major Required 54 Credits

Students will be required to study the following courses.

2-221-202	Statistics 1	3(3-0-6)
3-012-101	Industrial Management	3(3-0-6)
3-012-102	Engineering Materials	3(3-0-6)
3-012-103	Tool Engineering	3(2-3-5)
3-012-104	Industrial Engineering Drawing	3(1-6-4)
3-012-205	Work Study	3(3-0-6)
3-012-206	Machine Tool 1	3(1-6-4)
3-012-207	Manufacturing Process	3(3-0-6)
3-012-208	Welding Engineering 1	3(1-6-4)
3-012-309	Quality Control	3(3-0-6)
3-012-310	Computer Aided Design and Manufacturing	3(2-3-5)
3-012-311	Jig and Fixture	3(1-6-4)
3-012-312	Press Tool and Die	3(1-6-4)
3-012-313	Plastic Mold	3(1-6-4)
3-212-301	Engineering Metallurgy	3(2-3-5)
3-212-302	Engineering Material Testing	2(1-3-3)
3-212-303	Seminar in Industrial Manufacturing Problem	1(0-3-1)
3-212-304	Automatic Machines Engineering	3(2-3-5)
3-212-305	Design of Production Machine Elements	3(2-2-5)

C. Major Elective**18 Credits**

Students may select from the following courses.

3-013-304	Production Planning and Control	3(3-0-6)
3-013-307	Maintenance Engineering	3(2-2-5)
3-013-308	Industrial Plant Design	3(3-0-6)
3-013-417	Basic Logistics Engineering	3(2-3-5)
3-113-103	Industrial Mathematics	3(3-0-6)
3-113-418	Foundry Engineering	3(1-6-4)
3-123-415	Engineering Statics	3(3-0-6)
3-123-416	Mechanics of Material	3(3-0-6)
3-213-101	Industrial Organizational Management Psychology	3(3-0-6)
3-213-102	Industrial Management Laws	3(3-0-6)
3-213-203	Industrial Measurement and Instrumentation	3(2-2-5)
3-213-305	Industrial Economy	3(3-0-6)
3-213-306	Industrial Cost Analysis and Budget	3(3-0-6)
3-213-309	Welding Inspection	3(2-3-5)
3-213-310	Creative Product Design	3(2-3-5)
3-213-311	Heat Treatment of Steels	3(1-4-4)
3-213-412	Advanced Computer Aided Design	3(2-3-5)
3-213-413	Industrial Operations Research	3(3-0-6)
3-213-414	Sheet Metal and Pipe Practice	3(1-4-4)

D. Professional Experience**7 Credits**

Students may select from the following courses.

3-005-301	Pre-Cooperative Education	1(1-0-2)
3-005-402	Cooperative Education in/for Industrial Technology	6(0-40-0)
3-005-404	Professional Experience in Industrial	3(0-40-0)

In case students cannot enroll in Cooperative Education in Industrial Technology, he/she may take Professional Experience in Industrial and a Major Elective course for not less than 3 credits as a substitution.

3. Free Elective Courses

6 Credits

Student may enroll any courses at bachelor degree level which are taught by the faculty or other faculties for not less than 6 credits as Free Elective courses.

5.4 Course Description

1. General Education Courses

A. Social Sciences

1-121-003 Human Relations 3(3-0-6)

Preliminary knowledge of human relations, psychological theory related to human behavior and demand, self-development for human relations, human relations establishing techniques for family, society, and organization, and training for human relations.

1-122-003 The Philosophy of Sufficiency Economy 3(3-0-6)

Origin, definitions, and fundamental concept of the philosophy of sufficiency economy; the concept and theories concerning this philosophy and the application of this philosophy to lifestyles at individual, family, community, organization, and national levels; relevant case studies as well as the Royal Projects.

1-123-004 Economics for Everyday Use 3(3-0-6)

Basic principle in the economic activities of society e.g. economy, market and pricing mechanism, finance and banking, and international trade; the understanding of economic changes that affect the living and are the basis for application in daily life including inflation, deflation, unemployment, finance, national income, etc.

1-124-002 Thai Politics and Government 3(3-0-6)

Evolution of Thai's governments, institutions, and political processes; the democratic government with the King as the head of the state including constitution, parliament, ministry, judge, political parties, and benefit groups; the legislative processes, elections, government administrative regulations for central, regional, and local authority, and major political issues.

1-125- 002 Labor Law 3(3-0-6)

Concepts and meanings of labor law, employment, minimum wage rates setting, and principles of law relating to labor e.g. labor protection law, labor relation law, social security law, compensation law, labor court law, and labor cases procedures.

1-125-003 Intellectual Properties Law 3(3-0-6)

Concepts and reasons for the protection of intellectual properties, meanings and types of intellectual properties, laws and features of intellectual properties e.g. copyright, patent, trademark, and other rights focusing on meanings and characteristics of protected right, guideline, terms of right acquisition, right protection, right violation, intellectual properties disputing and settlement, process to resolve disputes, and arbitration process; the power of adjudication of the court case for intellectual properties and international trade, conversion of intellectual properties to capital, and other related laws; home protection agreement or relevant international treaties.

B. Humanities

1-130-001 Library and Information for Education 3(3-0-6)

Library information, other information sources, and information resources including storing, searching, and utilizing; writing of academic reports, bibliographies, and citations.

1-130-002 Information Resources for Academic Presentation 3(3-0-6)

Information resources in terms of categories, sources, organizations, services, accessing to information, and presentation of academic work.

1-130-003 Information Retrieval Technique 3(3-0-6)

Techniques for information retrieval, information retrieval in a library, information retrieval in scientific field and social science, electronic information retrieval, information management, citation and bibliography formats.

- 1-131-001 General Psychology 3(3-0-6)**
Meanings and scope of psychology, the influence of genetics and the environment, human development, various human organ systems in brief, intelligence, perception, learning, motivation, personality and adjustment, mental health and social behavior.
- 1-131-002 Personality Development Techniques 3(3-0-6)**
Basic knowledge in personality development, personality theory, factors that influence personality, personality improvement techniques, self-perceptions, the effects of human relationship toward personality, mental health and adjustment, and the complete personality development.
- 1-132-001 Man and Ethics of Living 3(3-0-6)**
Theories and basic concepts of morality and ethics, the importance of ethics in everyday life, criteria for judging the moral value and religious ethics, and having desirable attributes.
- 1-132-002 Buddhist Religion 3(3-0-6)**
Lord Buddha's biography, the history of Buddhist in Thailand, Buddhist principles applied in everyday life, practices to manage mental intelligence, religious ceremony, and roles and values of Buddhism in Thai society.
- 1-132-003 Religion and Way of Life 3(3-0-6)**
Background knowledge of the origin of religion, the social development led to ideology, beliefs and religion, doctrine and goals of world religions, the importance of religions to social development and the application of religious doctrine in everyday life.
- 1-133-001 Thai Studies 3(3-0-6)**
Background of the Thai race, Thai social, economy, government, Buddhism, tradition, language and literature, visual arts, craft, acting art, music, culinary, and intellectual heritage.
- 1-133-002 Thai Culture 3(3-0-6)**
Meanings and factors related to culture, and the background of Thai race and society; factors that influence diversity of Thai culture, important Thai cultures, cultural change, conservation and promotion of Thai culture in line with the current way of life.

1-134-001 Man and Arts 3(3-0-6)

Foundation of arts, and the necessity of art creation; the important factors influencing arts in each culture, different types of arts, different artistic expressions, visual arts and other arts. It also includes the relationship between man and arts, and the values of arts in relation to human development.

C. Languages

1-110-101 Thai Usage **3(3-0-6)**

Basic knowledge of Thai usage including listening, reading, writing, and speaking; comprehensive listening, critical listening, comprehensive reading, and analytical reading; writing of academic reports, official correspondence, application letters, projects, and report statements; and speaking during discussions, meetings and different occasions.

1-110-102 Thai for Communication 3(3-0-6)

Usage of Thai language in communication, characteristics of Thai language, communication theory and culture; the practice of 4 skills; listening, reading, speaking, and writing of Thai language for communication.

1-111-206 Speaking and Writing for Careers 3(3-0-6)

Speaking and writing for presentations, public relations, and career contacts.

1-112-313 Creative Writing 3(3-0-6)

Thai words usage, the meaning of the words, phraseology, text editing, and creative writing such as slogans, articles, short stories, and poetry.

1-211-001 General English 3(3-0-6)

Holding conversations related to greetings and introductions, requesting, asking for permission, thanking and apologizing, reading and writing instructions, describing everyday items, describing past, present, and future events.

- 1-211-002 English for Work 3(3-0-6)**
Holding conversations related to invitations and appointments, making telephone calls, expressing opinions, reading tables, short reports, general advertisements, job advertisements and biographies, writing resumes and job application letters, completing job application forms and participating in job interviews.
- 1-211-003 English for Every Use 3(3-0-6)**
Using English in greetings, introductions and giving directions, making telephone calls, appointments, reservations, and to do shopping; reading and listening to such everyday matters as news, announcements, and advertisements.
- 1-211-004 English for Communication 3(3-0-6)**
Translating and expressing ideas in all four communication skills - listening, speaking, reading, and writing.
- 1-211-005 English Conversation 3(3-0-6)**
Listening and speaking in everyday life contexts, skills focusing on pronunciation and precise communications.
- 1-211-006 General Reading 3(3-0-6)**
Reading newspapers, articles, magazines, textbooks; using dictionaries, predicting; using background and general knowledge, finding main ideas, topic sentences, supporting details; speed reading techniques, skimming, and scanning.
- 1-211-007 General Writing 3(3-0-6)**
Similarities and differences between spoken and written languages, writing sentences and paragraphs, filling in forms, writing personal letters and diaries, errors and correction.
- 1-211-008 English for Presentations 3(3-0-6)**
Writing product details and instructions for using the products, writing reports and projects, presenting work to the public.

1-211-009 English for Professional Purposes 3(3-0-6)

Reading articles, documents, periodicals, textbooks that are related to learners' specialized area of study; holding conversations in the target discipline, listening and reading for comprehension, interpretation and summarization, writing descriptions, delivering oral presentations on topics related to the profession.

D. Sciences and Mathematics

2-110-104 Chemistry for Everyday Use 3(3-0-6)

Chemical in daily use, contaminants in food, drinking and consumption water, washing compounds, cosmetics, medicines, polymers, and substances that cause harm.

2-110-107 Science and Technology for Local Wisdom 3(3-0-6)

Meaning and analysis of significances, types, and applications of Thai local wisdom; how to apply science and technology knowledge to explain what appears in the local wisdom, and using local wisdom based on science and technology for sustainable development. A field trip is included.

2-120-102 Environment and Resources Management 3(3-0-6)

Basic knowledge of environment and resource management, principles of ecology and natural balance, and natural resources and conservation; the environmental pollutions and disposal of scientific pollutants, environmental impact assessment, and administration for the integrated environmental development.

2-130-102 Science for Everyday Use 3(3-0-6)

Meanings of science, scientific processes, measurements and units of measurement, evolutionary theory, heredity, nature of the wave, and electromagnetic wave; the utilization of electrical and nuclear energy, chemicals in daily life, basic electronics, and basic principles of computer.

- 2-130-103 Science and Technology 3(3-0-6)**
 Scientific methods, computer and computing technology, communication technology and the Internet, and office equipments and home appliances; the synthetic substances and chemicals in daily life, environmental technology, future renewable energy, astronomy, and advance in space.
- 2-210-001 Mathematics for Everyday Use 3(3-0-6)**
 Preliminary calculation, introduction to financial mathematics, problem solving principles and methods of reasoning, and counting principles and basic probability of events; the creation of problems modeling in daily life and solutions, and data collection and presentation with the application of technology.
- 2-210-002 Mathematics for Decision Making 3 (3-0-6)**
 Basic logic and reasoning, introduction to statistics and data analysis, and data interpretation and presentation.
- 2-210-003 Mathematics for Cognitive Skill 3(3-0-6)**
 Set of numbers, factors, highest common factor, least common factor, and equations and inequations.
- 2-210-004 General Mathematics 3(3-0-6)**
 Sets, orders pair, relations and functions, exponent, logarithm, trigonometric, matrices, and determinant.
- 2-230-103 Introduction to Computer Assisted Instruction 3(2-2-5)**
 Importance and role of computers in teaching and learning; design principles, processes of creating instruction media with computer, characteristics of computer assisted instruction program, use of application packages to create computer assisted instruction lessons, and finding the effectiveness of the developed teaching materials.
- 2-230-104 Internet Technology and Applications 3(2-2-5)**
 Basic knowledge about Internet technology, and sending and receiving information on the network; the web pages designing and building, Internet security, and applications of Internet technology in the profession.

2-230-107 Package Program 3(2-2-5)

Study and practice about the application software packages commonly used nowadays e.g. business processing, basic homepage preparation, and presenting information in multimedia formats.

E. Physical Education and Recreation

1-141-001 Physical Education 1(0-2-1)

Basic principles and necessary practical skills of physical activities, to develop physical fitness, safety, and to provide practical knowledge and understanding of rules and etiquette of each sport which to be selected by students.

1-141-002 Badminton 1(0-2-1)

Basic principles and necessary practical skills of playing Badminton for single and double, to develop physical fitness, safety, and to provide practical knowledge and understanding of rules and etiquette of playing the game.

1-141-003 Tennis 1(0-2-1)

Basic principles and necessary practical skills of playing tennis for single and double, to develop physical fitness, safety, and to provide practical knowledge and understanding of rules and etiquette of playing the game.

1-141-005 Football 1(0-2-1)

Basic principles and necessary practical skills of playing football, to develop team spirit as well as physical fitness, safety, and to provide practical knowledge and understanding of rules and etiquette of playing the game.

1-141-011 Muay Thai 1(0-2-1)

Basic principles and necessary practical skills of muay thai, to develop physical fitness, safety, and to provide practical knowledge and understanding of rules and etiquette of playing the game.

1-141-013 Social Dance 1(0-2-1)

Basic principles and necessary practical skills of social dance, training in various social dances, to develop physical fitness, safety, and to provide practical knowledge and understanding of rules and etiquette of playing the game.

2. Specialization Courses

A. Professional Foundation

3-011-301 Seminar 1(0-2-1)

Preparation and seminar organization, presentation and circulations of reports, follow-up and evaluation, topics of interest.

3-001-302 Pre-Project 1(1-0-2)

Procedures and requirements for a project, a focused topic, objectives, scope, planning, report writing, a required format and presentation methods for a completed project.

3-001-403 Project 3(1-6-4)

Prerequisite : 3-001-302 Pre-Project

Integration of knowledge gained from the focused field to carry a project work, scheduling, operating, monitoring, problem analysis and solving, progress reports, documenting, and presentation of the completed project.

3-111-104 Technical Drawing 3(2-3-5)

Lettering, symbols, shapes, sizes, drawing standards, sketching, two-dimensional drawings, three-dimensional drawings, analysis, orthographic drawings, section views and manufacturing drawings.

3-111-105 Engineering Skills 3(1-6-4)

Using layout tools, basic measuring tools and small tools, adjusting and threading jobs, using basic machines including lathes, sawing, drilling and welding machines, turning operation, drilling and welding jobs, machine maintenance and safety at work.

3-111-106 Industrial Safety 3(3-0-6)

General knowledge of industry-based operations, safety rules, safety organizations, analysis, investigation, safety and accident reports, prevention, control, fire precautions, activities promoting safety, laws related to safety and health at work.

3-230-101 Electricity Technology 3(2-3-5)

Standards and safety in electricity, electrical system design, electricity measuring instruments, power system protection devices, lighting circuits, electrical mechanics, monitoring of selection and maintenance of power system, single-phase and three-phase electrical systems in industry.

3-230-102 Information and Communication Technology 3(1-4-4)

Advantages of information and communication technology; basic computer maintenance; operating system program; word processor and presentation program; internet; social networks; information searching; application of information and communication technology in everyday life; moral and ethics in information and communication technology; computer related crime act.

B. Major Required

2-221-202 Statistics 1 3(3-0-6)

Descriptive statistics, probability, random variables and their distributions, random sampling, sampling distribution, parameter estimation, hypotheses testing of one population mean, and the chi-square testing.

3-012-101 Industrial Management 3(3-0-6)

Principles of industrial management, industrial marketing, finance and accounting, planning and control, purchasing techniques, management of supply chains, human resources, international quality standards and productivity.

3-012-102 Engineering Materials 3(3-0-6)

Engineering materials including metals, ceramics, polymers, semi-conductor materials, new composite materials, atomic and crystal structures, solidification, mechanical properties and testing, plastic deformation and mechanism of a strength increase, phase diagrams, ferrous materials, non-ferrous materials, heat treatment, polymer, ceramics, composite materials, corrosion.

- 3-012-103 Tool Engineering 3(2-3-5)**
Theory and practice focusing on basic principles of tools engineering such as standards of engineering drawing, material tools, tolerance in fabrication and manufacturing for engineering, tools design in manufacturing engineering such as cutting tools, jigs, fixtures, press tools and dies, plastic molds and advanced machine tools, economics in tools engineering.
- 3-012-104 Industrial Engineering Drawing 3(1-6-4)**
Theory and practice focusing on industrial engineering drawing, tolerance systems, clearance systems, shape coordinates, manufacturing standards, part assembly, welding, sheet metals, manufacturing drawing.
- 3-012-205 Work Study 3(3-0-6)**
Principles of productivity, working time components, data recording and questioning techniques, production and operation charts, motion charts, string charts and two-hand charts, principles of motion efficiency, work sampling and standard time calculations, incentive payment and principles of ergonomics.
- 3-012-206 Machine Tool 1 3(1-6-4)**
Theory and practice focusing on structures, principles and safety rules for making parts using lathes, shaping, milling, cutting and grinding machines, sharpening blades and bits, practical jobs including facing, turning, slotting, cutting-off, drilling, boring, flat milling, stepping milling and flat shaping, maintenance of machine tools.
- 3-012-207 Manufacturing Process 3(3-0-6)**
Manufacturing processes, deformation methods, deformation cutting by machines, joint assembly, surface finishing, producing by metal press and plastic mold tools, advanced machine tools such as CNC, EDM and Wire Cut.
- 3-012-208 Welding Engineering 1 3(1-6-4)**
Theory and practice focusing on welding processes, effects of welding parameters, welding metallurgy, heat effects of welding, inspection and defect analysis, welding electrode standards, welding symbols and welding cost estimation.

3-012-309 Quality Control 3(3-0-6)

Principles of quality control in production systems, suitable selection of seven QC tools such as Pareto charts, fishbone diagrams, brainstorming, QC circle techniques, and control charts, QC planning, sampling, scheduling, cost estimating for the quality system, reliability and QA of products.

3-012-310 Computer Aided Design and Manufacturing 3(2-3-5)

Theory and practice focusing on computer-aided design (CAD) using modern computer-aided manufacturing (CAM) software, 2-dimensional and 3-dimensional drafting and modeling, computer-aided manufacturing using tools operating with modern computer programs and using CNC machines.

3-012-311 Jig and Fixture 3(1-6-4)

Theory and practice focusing on jig and fixture design including modular systems, selection of materials, standard parts, problem analysis, solving in using jigs and fixtures in manufacturing.

3-012-312 Press Tool and Die 3(1-6-4)

Theory and practice focusing on press tool and die design, shearing and forming process, types of blanking dies, forming dies, materials selection, standard parts, press machines, calculating forces, analysis of blanking, forming parts characteristics to find a correct approach to press tool and die design.

3-012-313 Plastic Mold 3(1-6-4)

Theory and practice focusing on plastic thermoforming mold design, plastic properties, plastic manufacturing, selection of materials, machines, standard parts for thermoforming mold making, preventive maintenance, problem analysis in plastic thermoforming.

3-212-301 Engineering Metallurgy 3(2-3-5)

Theory and practice focusing on devices used in metallurgy, metal structure and crystallization, metal deformation, recovery, recrystallization and grain growth, solidification of metals, equilibrium diagrams of binary systems, iron-iron carbide equilibrium diagrams, heat treatment of metals, practical jobs on micro structure inspection.

3-212-302 Engineering Material Testing 2(1-3-3)

Theory and practice focusing on material properties testing under different types of forces – tensile, compressive, shear, torsion, impact, hardness, fatigue, micro structure analysis, non-destructive material testing.

3-212-303 Seminar in Industrial Manufacturing Problem 1(0-3-1)

Seminars on industrial activities including practice in writing projects with KPI, inviting insider and outsider experts. A team action, brainstorming, systematic problem solving, monitoring, evaluation, reports, presentations as defined in a quality team model.

3-212-304 Automatic Machines Engineering 3(2-3-5)

Theory and practice focusing on automatic machines operating with computer numerical control (CNC), principles and systems of lathe and milling CNC machines, electrical discharge machines (E.D.M) controlled by numerical control systems, G code, M code, planning and writing programs, controlling turning and milling automatic machines, the CAD/CAM system, maintenance and safety in using CNC machines.

3-212-305 Design of Production Machine Elements 3(2-2-5)

Theory and practice focusing on principles of manufacturing machine parts design, analysis of stress-strain, transmission systems, calculating to design machine parts such as shafts, screws, bolt-nuts, keys, belts, spring bearings and gears. Rivet design, welding, selection of materials for manufacturing machine parts, analysis of motion, velocity and acceleration mechanisms, balancing, planning and safety.

C. Major Elective

3-013-304 Production Planning and Control 3(3-0-6)

Principles of production management, demand forecasting techniques, production and manufacturing resource planning, inventory management, production sequencing, production control and project controlling by PERT/CPM techniques.

3-013-307 Maintenance Engineering 3(2-2-5)

Theory and practice focusing on principles of machinery maintenance, causes of deteriorations, machine inspection, lubrication in maintenance, planning, repairing, safety control in repair jobs, evaluation of machine maintenance.

3-013-308 Industrial Plant Design 3(3-0-6)

Basic principles of industrial plant design, product analysis, design procedures, necessary facilities for the layout, location selection, machines and installation, materials and project handling, model developing, decision makings, computer-aided design, laws and regulations related to plant design.

3-013-417 Basic Logistics Engineering 3(2-3-5)

Logistic engineering concepts, customer demand forecasting, balancing in production system, material and inventory management, transportation planning and distribution, decision criteria, efficiency measurement of logistic systems and supply chain management, relationship between logistics, supply chain management and other production strategies, application of logistics, supply chain management, industrial purchasing.

3-113-103 Industrial Mathematics 3(3-0-6)

Tolerance systems, calculation of circumference, area, capacity, weight, stress in beams and moment, pressure, heat and transmission systems, taper turning, stress-strain in machines, calculation of efficiency on screws, pulleys, hydraulics and pneumatics, calculation of manufacturing time using machines.

3-113-418 Foundry Engineering 3(1-6-4)

Theory and practice focusing on casting processes, cavity molds for casting, the importance of sand molds, cavity mold design testing, metal water feed systems, hardness of metals in the mold cavity, metal water filling systems, Heron's casting, metal casting furnaces, defect prevention and repair.

3-123-415 Engineering Statics 3(3-0-6)

Principles of mechanics, forces and moments, forces systems, results of forces systems, equilibrium, free body diagram writing, forces analysis in the structure and machine parts, friction, center of gravity, center of mass, moment of area and principles of virtual work.

- 3-123-416 Mechanics of Material 3(3-0-6)**
 Stress and strain, relationship of stress and strain, temperature stress, pressure vessels and welding, torsion of shafts and hollow shafts, shear force and bending moment diagrams, calculating stress, shear stress and deflections in beams.
- 3-213-101 Industrial Organizational Management Psychology 3(3-0-6)**
 Principles of industrial organization management psychology, individual differences, staffing and human resource development, coaching strategies, job assignments and commanding, job monitoring, organizing group activities, leadership and commanding strategies, report and evaluation techniques in industrial management.
- 3-213-102 Industrial Management Laws 3(3-0-6)**
 Introduction to laws, laws concerning labor, welfare and protection, trade and investment, intellectual properties, environment and health standards, taxes, investment subsidies, industrial standards, and international trades.
- 3-213-203 Industrial Measurement and Instrumentation 3(2-2-5)**
 Principles related to dimensions of geometry shapes and tolerance standards, using measuring tools such as vernier calipers and micrometer calipers, industrial instrumentation for measuring vibration, flow rate, temperature and pressure, principles of signal exchange and signal adjustment, C.M.M., calibration procedures, analysis of experiment results using statistic procedures.
- 3-213-305 Industrial Economy 3(3-0-6)**
 Basic concepts of industrial economics, principles of time value for money, economical analysis for industrial application, industrial economic investment decision making, retune on investment of industrial projects.
- 3-213-306 Industrial Cost Analysis and Budget 3(3-0-6)**
 Industrial accounting, budget accounting, cost estimating, calculation of job order cost and activity-based costing, process costing, regular and standard costing, budgeting analysis for production planning and profits, financial statement analysis.

- 3-213-309 Welding Inspection 3(2-3-5)**
Theory and practice focusing on methods and procedures for welding inspection, principles and guidelines for quality assurance standards in destructive and non-destructive testing, conclusion making and recording inspection results.
- 3-213-310 Creative Product Design 3(2-3-5)**
Product design and development process, customer need analysis, quality function deployment, value engineering, reverse engineering, creative concepts for products, design for manufacturing and environment, prototype building and testing, product development design evaluation.
- 3-213-311 Heat Treatment of Steels 3(1-4-4)**
Theory and practice focusing on structure transformations, time-temperature-transformation diagrams, isothermal transformation and continuous cooling diagrams, heat treatment of steels, low alloy, high alloy steels and non-ferrous metals, practical jobs on heat treatment, defect analysis, problem solving.
- 3-213-412 Advanced Computer Aided Design 3(2-3-5)**
Theory and practice focusing on principles and methods of 3-dimensional designs, using modern software.
- 3-213-413 Industrial Operations Research 3(3-0-6)**
Basic principles of industrial operation research, linear programming, transportation problems, dynamic scheduling, game theory, queuing theory, simulation in decision making.
- 3-213-414 Sheet Metal and Pipe Practice 3(1-4-4)**
Practice focusing on sheet metals and drawing development in the industry, standard piping systems, inspection of water piping and ducts systems, piping design and installation using modern equipment.

D. Professional Experience

3-005-301 Pre-Cooperative Education 1(1-0-2)

Principles, procedures, and regulations about cooperative education, selection of work establishment, application letter writing and interviews, personality development, quality management in the organization, occupational health and safety, ethics and professional conducts, report writing and presentation.

3-005-402 Cooperative Education in/for Industrial Technology 6(0-40-0)

Prerequisite : 3-005-301 Pre-Cooperative Education

Professional experiences related to industrial technology industrial technology major. Under the supervision of the course. Employees continue with the ginger. The practice continued during the first semester and not less than 17 weeks, and a report on the operation. Presentation and performance.

3-005-404 Professional Experience in Industrial 3(0-40-0)

Prerequisite : 3-005-301 Pre-Cooperative Education

Work experiences in the industry, skills in working with employees, training in an area related to industrial technology such as production control, quality inspection and productivity, writing a report on knowledge obtained and jobs completed.