

# FACULTY OF MEDICINE KMITL

King Mongkut's Institute of Technology Ladkrabang

# CURRICULUM







# CORE COURSES

# 1. GENERAL EDUCATION SUBJECTS

## 1.1 SCIENCES AND MATHEMATICS

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17616001 Scientific methods 2 (2-0-4)  
SCI METHODS

History of sciences and discovery; principle of scientific methods, questioning methods, problem prioritization, hypothesis generation, induction and deduction reasoning, hypothetico-inductive model; systems sciences; concept of critical thinking, logic, assumptions, validity, perspectives, and valid reasoning; trait of critical thinkers, pitfalls in reasoning; basic laboratory methods and techniques

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17616002 Applied physics and mathematics for health sciences 2 (1-2-3)  
APP PHYS MATH HEALTH SCI

Anthropometry; techniques of computational methods; calculus of variations, finite difference and finite element methods and complex analysis; fundamentals of analysis, linear equation solutions and inverse matrix; equilibrium of forces; torque; elasticity of material; rotation; moment of inertia; angular momentum; fluid mechanics; buoyancy; viscosity; blood circulation; surface tension; capillary; osmosis; lung expansion; heat in the body; muscle; sound and response; ultrasonic waves; optical instruments; analytical instruments; fiber optics; electricity; X-ray; radioactivity

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17616003 Computer and digital technology for health sciences 2 (1-2-3)  
COMP DIGITAL TECH HEALTH SCI

Application of computer and digital technology in health sciences; digital record and monitoring of health parameters and vital statistics; principle of medical imaging and digital archiving system; electronic medical records and hospital information systems; telecommunication and mobile digital technology in medicine and health care services

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## 1.2 LANGUAGE SUBJECTS

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17626171 Communication in Thai for medical profession 3 (2-2-5)  
COM THAI MED PROF

Thai language; principle of communication (verbal and non-verbal), importance of communication in health care services; essential skills in active listening and discussion; communication in social network and constructive confrontation; practice in communication with patients, relatives and colleagues; dealing with the media.

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17626172 English for medical professions 3 (2-2-5)  
ENG MED PROF

English for academic communication, essential medical Etymology; root words, suffixes and prefixes of the medical term; English for medical study. Medical correspondence; writing medical certificates, medical documents and academic papers; reading research papers, textbooks, and medical articles with critical appraisal skills

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17626173 Academic reading and writing for biomedical sciences 3 (2-2-5)  
ACAD READ WRTIE BIOMED SCI

Concept of critical reading; skills for academic reading, improving reading speed, using reading strategies to improve text comprehension, organization of different types of texts, academic vocabulary; academic writing skill, writing with logical development and clarity of thought, pre-writing activities and idea generation, writing an effective and focused introduction, detailed body, and conclusion, rhetorical styles; process of peer editing

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17626174 Selective study in language subjects 3 (2-2-5)

An elective study or practice in language subjects according to personal interest and for the benefit of professional and personal development

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## 1.3 HUMANITY SUBJECTS

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17636001 Creative thinking and innovation 2 (2-0-4)  
CREAT THINK INNOV

Creativity; features of creative thinking, divergent and convergent, lateral thinking; creative methods, evolution, synthesis, revolution, reapplication; need of creativity in information institutions; habits and characteristics of the creative information professional, analytical and creative thinking; barriers of creative thinking and ways of motivation; creativity and innovation in health sciences

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17636002 World Culture 2 (2-0-4)  
WORLD CULTURE

History of human civilization; western culture and philosophy; eastern culture and philosophy; Thai history, culture and philosophy; international organization, collaboration, law and regulation; multiculturalism in Thailand and the ASEAN region; effects of globalization on culture and socioeconomic development

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17636003 Medical ethics and laws 2 (1-2-3)  
MED ETH LAWS

Principles of medical ethics; concepts of autonomy, beneficence, non-maleficence, and justice; concepts of deontology, teleology, and virtue theory; ethics and religions; basic knowledge in civil and criminal laws; professional and related medical laws; disclosure of medical errors; medicolegal and ethical dilemma

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## 1.4 SOCIAL SCIENCE SUBJECTS

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17646001 Human behavior and sociology 2 (2-0-4)  
HUM BEHAV SOC

Human behaviors, biological basis of thought, behaviors, motivation and emotion; concept of sociology; relationship between self and society; urbanization; impact of belief and religion on behaviors; social determinant of health and illness; sociological perspectives of health and illness; distributions of health and illness by social factors including sex/gender, race/ethnicity, and socioeconomic status; issues related to an aging society

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17646002 Fundamental health economics 2 (2-0-4)  
FUND HEALTH ECON

Principle of economics, macroeconomics, microeconomics; nature of health economics; health care system and health care financing; concepts of efficiency, effectiveness, efficacy; concepts of equity and equality; market concepts, cost, price, demand and supply of health care services; application of economic principles in health care decision making; health care reforms.

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17646003 Health policy and public welfare 2 (2-0-4)  
HEALTH POL PUBL WELF

Principle of public policy, population health and welfare; decisions, plans, and actions undertaken to achieve specific health care goals; prioritization in health; role of government; concept of health system research; principles of good governance, concepts of accountability, transparency, rule of laws, equitability and fairness, participatory, consensus oriented, effectiveness and efficiency, responsiveness; good governance and health care; role of good governance in the 21st century.

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## 2. SPECIFIC SUBJECTS

### 2.1 MEDICAL SCIENCES SUBJECTS

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17656001 Introduction to medical profession 2 (1-2-3)  
INTRO MED PROF

History of medicine; doctor's life and career path; social expectation and social accountability of medical professionals and university graduates; concepts of health, health care provider and community services; concepts of healer, health promotion, holistic care and related terms; doctor-patient and doctor-pharmaceutical industry relationship; patient's rights; beginning-of-life and end-of-life issues; traditional, alternative and complementary medicine

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17656002 Medical biochemistry and molecular biology 2 (1-2-3)  
MED BIOCHEM MOL BIO

Chemical structure and biomedical importance; chemical reaction: redox and acid-base equilibrium; biochemical analysis, identification, and quantification of medicinal, pharmaceutical and biological compounds; functions and metabolism of biomolecules; structure of gene and genome; laboratory methods and techniques in DNA, RNA and protein sciences

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17656003 Cell and tissue physiology 2 (1-2-3)  
CELL TISSUE PHYSIO

Biology of cell of higher organisms: The structure, function and biosynthesis of cellular membrane and organelles; cell growth and differentiation; membrane transport, receptors and cell signaling; the cytoskeleton, the extracellular matrix, and cell movement; the functional interaction of the cell with its microenvironment; basic tissue structures and functions

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17656004 Clinical anatomy and medical imaging 3 (2-4-3)  
CLIN ANAT MED IMAG

Normal body structures and organ systems; gross and microscopic dissection of human body by regions; surface anatomy and surgical landmarks; basic principles of medical imaging; indications, contraindications, limitations, preparations, techniques and complications of radiological investigations including plain and contrasted X-ray study, computed tomography, ultrasonography, magnetic resonance and radionuclide imaging; radiation hazard; clinical correlation and interpretation of commonly used medical imaging

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17656005 Body movement and control 2 (1-2-3)  
BODY MOVE CONT

Musculoskeletal system, muscles, tendon, ligament, bones; concept of control system, feed-forward and feedback, central and peripheral nervous system and control mechanisms, types and control of movement, reflexive movement, rhythmic movement, goal-directed movement; mechanism maintaining posture, locomotion, movement and behavior

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17656006 Body fluid homeostasis I 4 (2-4-6)  
BOD FLU HOMEO I

Structure and function of the cardiovascular system; cardiac function, pacemaker and heart rate control; electrocardiogram, echocardiography and Doppler ultrasonography of cardiovascular system; hemodynamics, systemic and regional circulatory control, autoregulation, control of blood volume, hematopoietic system, blood cells and blood component; hemoglobin synthesis, structure and function; hemostasis mechanism

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17656007 Body fluid homeostasis II 4 (2-4-6)  
BOD FLU HOMEO II

Structure of the pulmonary system, pulmonary physiology, including respiratory mechanics, ventilation, perfusion, ventilation-perfusion relationships, diffusion, the control of breathing, transport of oxygen and carbon dioxide; structure and function in the renal organ system,

embryologic basis of structure-based malfunctions in the kidney, acid-base regulation of blood and biochemistry of body fluid, mechanisms controlling body fluid homeostasis, cellular processes mediating the actions of pharmaceutical agents that are active in the renal system, role of renal system in establishing drug levels in circulation

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17656008 Body energy homeostasis 4 (2-4-6)  
BOD ENER HOMEO

Homeostatic regulation of food intake and energy expenditure, neural control of food intake, structure and function of digestive system, cellular processes mediating the actions of pharmaceutical agents that are active in the digestive system; concepts of nutrient function, metabolism and interaction in humans, metabolic and physiological functions of nutrients at the molecular, cellular, tissue, organ and system level, integrating the effects of nutritional status in health and disease.

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17656009 Body regulation and defense 4 (2-4-6)  
BOD REG DEF

Principle of control system, system components and interaction, input and output, control mechanism, internal process, interaction, boundary and interface, feed forward and feedback; autonomic nervous system, sympathetic, parasympathetic and enteric nervous system; endocrine system and hormonal control, neural and humoral interaction; Principle of body defense in health and diseases, innate and acquired immunity, antibody-mediated and cell-mediated immunity, modulation of immune system, infection and inflammation, basic mechanisms of autoimmune disorders and hypersensitivity reactions, immune response to tumors

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17656010 Sex, gender, reproduction and healthy living 4 (3-3-6)  
SEX GEND REPRO & HEALTHY LIV

Structure and function of reproductive system, sex hormone, sex and gender development, biological and psychosocial determinant of sex and gender; sexual behavior, sexual dysfunction and disorders; disorders and diseases of male and female reproductive system; women health problems related to puberty, menstruation, pregnancy, maternity, menopause; anatomy and physiology of gestation, birth and birth control; Concept of health and healthy living from birth to death; health promotion for people in each stage of life

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17656011 Brain and mind 4 (3-3-6)  
BRAIN MIND

Brain and behaviors, neuronal doctrine, the biological bases of behavior, neural mechanism controlling consciousness, perception, cognition, complex motion, learning and memory, decision making, emotion, mood, personality and individuality, social and group dynamics, developmental processes, and behavioral disorder

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17656012 Human genetics, growth and development 4 (3-3-6)  
HUM GEN GROWTH DEV

Principles of genetics; inheritance patterns, pedigrees and risk calculation, population genetics, multifactorial/complex diseases, molecular genetics, human genome, gene function; interaction between gene and environment; intrauterine growth from fertilization to fully developed



stage; normal development of human, growth, physical and psychosocial development of infancy, toddlers, children of pre-school age, children of school age and teenagers; personality development; moral and ethical development; physical and psychosocial change of adults and elderly people

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17686001 Research methodology, biostatistics and epidemiology 4 (3-3-6)  
RES METHOD BIOSTAT EPIDEMIO

Principle of scientific method, questioning methods, problem prioritization, hypothesis generation, induction and deduction reasoning, hypothetico-inductive model; systems sciences; concept of critical thinking, logic, assumptions, validity, perspectives, and valid reasoning; trait of critical thinkers, pitfalls in reasoning; research design, data collection, population and sampling technique, measurement, data processing and analysis, research ethics, research instrumentation; basic statistical concepts, descriptive and inferential statistics, measurement, central tendency and variation, comparing between groups, analysis of variance, regression and statistical modeling

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17656013 Molecular medicine and pharmacotherapeutics 3 (2-4-3)  
MOL MED PHARMACO

Nature and causes of cell injury and death; adaptive cellular changes; cell survival and cell death, healing and repair, body response to physical, biological and chemical injuries, thrombosis, embolism and infarction and neoplasia; interrelationships among organ systems in deviations from homeostasis; gross, microscopic and molecular pathology from clinical specimens; epigenetics; cytogenetics, molecular genetics; cancer genetics; Basic pharmacological principles; receptor biology, principles of drug action and administration; pharmacokinetics and pharmacodynamics; adverse drug reaction and drug interaction; drug development and regulatory issues; prescription writing and rational drug use; biological and cell therapy; immunotherapy, cytokines, vaccine, monoclonal antibody, anti-angiogenesis, gene therapy; stem cell therapy

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17656014 Arts and sciences of clinical diagnosis 3 (2-4-3)  
ARTS SCI CLIN DIAGN

Principle and practice of history taking and physical examination; symptoms and signs of common diseases; bedside diagnostic procedures and tests; interpretation of laboratory results and medical images; clinical reasoning and decision making; doctor-patient relationships; self-directed and reflective learning in the clinical settings; continuous professional development

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17656015 Clinical microbiology and infectious diseases 3 (2-4-3)  
CLIN MICROBIO INFECT DIS

Microorganisms causing diseases in human; interaction between host and germ; immunity and body response to infection; approach to fever, local and systemic infection; sepsis and systemic inflammatory response syndrome; microbiological and serological diagnosis of common infectious diseases; tropical infection; nosocomial infection; HIV medicine; rational use of antibiotics and antimicrobial agents

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17656016 Cardiovascular medicine 3 (3-2-4)  
CARDIOVASC MED

Nature and causes of disorders affecting cardiovascular system; pathophysiology, pathology, symptomatology, laboratory and diagnostic imaging, pharmacological and non-pharmacological treatment of common heart and vessel diseases

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17656017 Respiratory medicine 3 (3-2-4)  
RESP MED

Nature and causes of disorders affecting respiratory system; pathophysiology, pathology, symptomatology, laboratory and diagnostic imaging, pharmacological and non-pharmacological treatment of common lung and airway diseases

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17656018 Gastroenterology and hepatology 3 (3-2-4)  
GASTRO HEPATO

Nature and causes of disorders affecting gastrointestinal and hepatobiliary systems; pathophysiology, pathology, symptomatology, laboratory and diagnostic imaging, pharmacological and non-pharmacological treatment of common gastrointestinal and liver diseases

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17656019 Renal and genitourinary medicine 3 (3-3-3)  
RENAL GENITOURIN MED

Nature and causes of disorders affecting renal and genitourinary systems; disorders of body fluid volume, acid-base and electrolytes; pathophysiology, pathology, symptomatology, laboratory and diagnostic imaging, pharmacological and non-pharmacological treatment of common renal and genitourinary diseases

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17656020 Allergy, immunology and rheumatology 2 (1-2-3)  
ALLER IMMUNO RHEUMATO

Nature and causes of disorders affecting immunity; disorders of connective tissues and musculoskeletal system; pathophysiology, pathology, symptomatology, laboratory and diagnostic imaging, pharmacological and non-pharmacological treatment of allergic, autoimmune and rheumatologic diseases

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17656021 Endocrinology and metabolism 2 (2-1-3)  
ENDOCRIN METABOL

Nature and causes of disorders affecting endocrine system and human metabolism; pathophysiology, pathology, symptomatology, laboratory and diagnostic imaging, pharmacological and non-pharmacological treatment of diabetes mellitus, common diseases of thyroid, pituitary, adrenal gland and calcium metabolism

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17656022 Hematology and oncology 4 (4-4-4)  
HEMATO ONCO

Nature and causes of disorders affecting hematopoietic system; molecular and cellular mecha-

nism of hematopoiesis and oncogenesis; molecular and cellular study of blood and cancer cells; cancer genetics and cancer immunity; pathophysiology, pathology, symptomatology, laboratory tests and diagnostic imaging of common blood diseases and cancers; anti-neoplastic chemotherapy, radiotherapy, molecular targeted therapy, immunotherapy, blood transfusion and stem cell transplantation

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17656023 Clinical neurosciences 3 (3-2-4)  
CLIN NEUROSCI

Nature and causes of disorders affecting human nervous system, diseases of peripheral and central nervous system, pathophysiology, pathology, symptomatology, laboratory and diagnostic imaging, pharmacological and non-pharmacological treatment of common neurological diseases

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17656024 Mental health and psychopathology 3 (3-2-4)  
MENT HEALTH PSYCHOPATH

Nature and causes of disorders affecting human mind, behaviors and emotion; pathophysiology, pathology, symptomatology, laboratory and diagnostic imaging, pharmacological and non-pharmacological treatment of common psychiatric conditions

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17656025 Aging and degenerative disorders 2 (1-2-3)  
AGING DEGEN DIS

Human aging, physiology of aging, pathogenesis of degenerative process, physiology and pathology of dying and death; pathophysiology, pathology, symptomatology, laboratory and diagnostic imaging, pharmacological and non-pharmacological treatment of common degenerative disorders

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17656026 Evidence-based medicine 3 (2-4-3)  
EVID BASED MED

Evidence-based medicine and medical practice; formulating questions; biomedical information search; appraising the evidence from medical literatures and its application for clinical decision making including disease prognosis, laboratory investigation, and therapy; literature review, meta-analysis and clinical practice guidelines

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17656027 Health promotion and disease prevention 1 (1-0-2)  
HEALTH PROM DIS PREV

Concept of health promotion, health determinants, health equity, social justice and human rights; concept of community medicine, health and the community, urban medicine, effect of environment and occupation on health, disease prevention and control

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17686002 Integrated biomedical sciences 1 (0-1-2)  
INTEG BIOMED SCI

Integration of basic medical sciences underlying normal and abnormal conditions, structure

and function of major organ systems, diseases processes, pathophysiology and pathogenesis to answer biomedical questions of clinical importance

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17686003 Research experiences in biomedical sciences 2 (0-6-0)  
RESEARCH EXP BIOMED SCI

An elective study on research in various biomedical sciences or related disciplines relevant to personal interest and for the benefit of professional and personal development

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## 2.2 CLINICAL CLERKSHIP AND PRACTICUM SUBJECTS

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17666001 Essential clinical skills 2 (1-3-2)  
ESSEN CLIN SKILLS

PREREQUISITE: 17686002

Principles and practice of essential clinical skills including history taking, physical examination, basic medical and surgical procedures, problem-orientated medical record (POMR); effective clinical communication; occupational risks; stress management; medical professionalism

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17666002 Forensic medicine 2 (1-3-2)  
FORENS MED

Principles of forensic medicine; autopsy and postmortem investigation; clinical toxicology; medical certificate and expert witness in the court; medicolegal issues in clinical practice

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17666003 Family medicine clerkship 4 (1-6-5)  
FAM MED CLERK

PREREQUISITE: 17686002

COREQUISITE: 17666001

Fundamentals of clinical examination, evaluation, and care provision; practice in family medicine; rational investigation; pathophysiology, pathogenesis and rational management of common diseases or disorders which are of public health importance; principle and practice of preventive medicine, occupational medicine and home health care; writing medical record and progress notes, performing procedures; patient education practice; application of principles of holistic care, health promotion, evidence-based medicine, medical ethics and related laws for patient care; clinical practice with professional habits and attitude

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17666004 Community and global medicine 2 (1-3-2)  
COM GLOBAL MED

Principle and practice of community medicine; community survey for diagnosis, treatment and prevention of major public health issues; community engagement, social aspects of health care

services; urban and rural medicine, traveler medicine; medical aspects of globalization, natural disaster and terrorism

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17666005 Neurology, geriatric and rehabilitation medicine clerkship 4 (3-3-6)  
NEURO GERIATRIC REHAB MED CLERK

PREREQUISITE: 17666001

Fundamentals of clinical examination, evaluation, and care provision; practice in neurology and geriatric medicine services; rational investigation; pathophysiology, pathogenesis and rational management of cerebrovascular, neuromuscular and neurodegenerative disorders which are of public health importance; principle and practice of rehabilitation medicine and physiotherapy; writing medical record and progress notes, performing procedures; patient education practice; application of principles of holistic care, health promotion, evidence-based medicine, medical ethics and related laws for patient care; clinical practice with professional habits and attitude

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17666006 Psychiatry clerkship 4 (3-3-6)  
PSYCH CLERK

PREREQUISITE: 17666001

Fundamentals of psychiatric interview, mental status examination, evaluation, and care provision; practice in psychiatric services; taking patient histories, performing complete physical and mental examinations, writing medical record and progress notes; approach to common psychiatric problems; rational psychological and laboratory investigation; psychodynamics, personality factors, pathogenesis, and rational management of important psychiatric disorders

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17666007 Internal medicine clerkship 4 (2-6-4)  
INTERNAL MED CLERK

PREREQUISITE: 17666001

History taking and physical examination; approach to common problems in the general medical wards including internal medicine and medical subspecialties; rational investigation; pathophysiology, pathogenesis and rational management of diseases and disorders in the in-patient settings which are of public health importance; writing medical record and progress notes, performing medical procedures; patient education practice; application of principles of holistic care, health promotion, evidence-based medicine, medical ethics and related laws for patient care; clinical practice with professional habits and attitude

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17666008 Surgery clerkship 4 (2-6-4)  
SURG CLERK

PREREQUISITE: 17666001

History taking and physical examination; approach to common problems and practice in the surgical wards, operating theatres, out-patient and emergency departments; rational investigation; pathophysiology, pathogenesis and rational management of diseases and disorders which are of public health importance; writing medical record and progress notes, assisting surgical

procedures. patient education practice; application of principles of holistic care, health promotion, evidence-based medicine, medical ethics and related laws for patient care; clinical practice with professional habits and attitude

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17666009 Anesthesiology, cardiology and critical care medicine clerkship 4 (2-6-4)  
ANESTH CARDIO CRIT CARE MED

PREREQUISITE: 17666001

Approach to common problems and practice in the intensive care, respiratory care and coronary care units and operating theatres; airway management; anesthetic methods, general anesthesia, locoregional anesthesia; pre-operative evaluation and preparation; choice of anesthesia, complications in anesthesia; postoperative care; fluid and blood transfusion; oxygen therapy; drugs used in anesthesia and critical care; respiratory and hemodynamic monitoring; application of principles of holistic care, health promotion, evidence-based medicine, medical ethics and related laws for patient care; clinical practice with professional habits and attitude

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17666010 Ambulatory care clerkship 4 (2-6-4)  
AMB CARE CLERK

PREREQUISITE: 17666001, 17666007

History taking and physical examination; approach to common problems in ambulatory care setting including dermatology, ophthalmology, otolaryngology and general medical clinics; rational investigation; pathophysiology, pathogenesis and rational management of diseases and disorders in ambulatory care settings which are of public health importance; writing medical record and progress notes, performing medical procedures; patient education practice; application of principles of holistic care, health promotion, evidence-based medicine, medical ethics and related laws for patient care; clinical practice with professional habits and attitude

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17666011 Accident and emergency medicine clerkship 4 (2-6-4)  
ACC EMER MED CLERK

PREREQUISITE: 17666001, 17666008

History taking and physical examination; approach to common problems and practices in the emergency department, trauma and orthopedic services; rational investigation; pathophysiology, pathogenesis and rational management of diseases and disorders which are of public health importance; writing medical record and progress notes, performing procedures; patient education practice; application of principles of holistic care, health promotion, evidence-based medicine, medical ethics and related laws for patient care; clinical practice with professional habits and attitude

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17666012 Oncology and palliative medicine clerkship 4 (2-6-4)  
ONCO PALLIATIVE MED CLERK

PREREQUISITE: 17666001, 17666007

Fundamentals of clinical examination, evaluation, and care provision; practice in oncology services; rational investigation; pathophysiology, pathogenesis and rational management of

common cancers which are of public health importance; principle and practice of chemotherapy, radiotherapy and palliative care for cancer; writing medical record and progress notes, performing procedures; patient education practice; application of principles of holistic care, evidence-based medicine, medical ethics and related laws for patient care; clinical practice with professional habits and attitude

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17666013 Obstetrics and gynecology clerkship 4 (2-6-4)  
OB GYN CLERK

PREREQUISITE: 17666001

History taking and physical examination; approach to common problems in the antenatal care clinic, obstetrics and gynecology ward, labor room and operating theatre; rational investigation; pathophysiology, pathogenesis and rational management of diseases and disorders which are of public health importance; writing medical record and progress notes, performing procedures; patient education practice; application of principles of holistic care, health promotion, evidence-based medicine, medical ethics and related laws for patient care; clinical practice with professional habits and attitude

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17666014 Pediatrics clerkship 4 (2-6-4)  
PED CLERK

PREREQUISITE: 17666001

History taking and physical examination; approach to common problems in the pediatric wards, well-baby and pediatric clinic; rational investigation; pathophysiology, pathogenesis and rational management of diseases and disorders in the childhood and adolescence which are of public health importance; writing medical record and progress notes, performing procedures; patient education practice; application of principles of holistic care, health promotion, evidence-based medicine, medical ethics and related laws for patient care; clinical practice with professional habits and attitude

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17676001 Introduction to clinical practice in the health care system 2 (0-4-2)  
INTRO CLIN PRAC HEALTH CARE SYS

Learning from clinical practice in the health care system, hospital administration and work flow; principle and practice of patient safety, basic and advanced cardiac life support, medication and intervention safety, infection control; management of electronic medical records, laboratory and imaging archives; risk management, multidisciplinary patient care team, quality improvement project

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17676002 Practicum in internal medicine 4 (0-12-0)  
PRAC INTERNAL MED

PREREQUISITE: 17666007

Working and learning as a member of multidisciplinary patient care team in the internal medicine service of a general hospital; application of principles of holistic care, health promotion, evidence-based medicine, medical ethics and related laws for reflective patient care in internal medicine

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17676003 Practicum in surgery 4 (0-12-0)  
PRAC SURG

PREREQUISITE: 17666008

Working and learning as a member of multidisciplinary patient care team in the surgical service of a general hospital; application of principles of holistic care, health promotion, evidence-based medicine, medical ethics and related laws for reflective patient care in surgery

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17676004 Practicum in pediatrics 4 (0-12-0)  
PRAC PED

PREREQUISITE: 17666014

Working and learning as a member of multidisciplinary patient care team in the pediatric service of a general hospital; application of principles of holistic care, health promotion, evidence-based medicine, medical ethics and related laws for reflective patient care in pediatrics

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17676005 Practicum in obstetrics and gynecology 4 (0-12-0)  
PRAC OB GYN

PREREQUISITE: 17666013

Working and learning as a member of multidisciplinary patient care team in the obstetric and gynecological service of a general hospital; application of principles of holistic care, health promotion, evidence-based medicine, medical ethics and related laws for reflective patient care in obstetrics and gynecology

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17676006 Practicum in orthopedics and emergency medicine 4 (0-12-0)  
PRAC ORTH EMER MED

PREREQUISITE: 17666011

Working and learning as a member of multidisciplinary patient care team in the orthopedic service and emergency room of a general hospital; application of principles of holistic care, health promotion, evidence-based medicine, medical ethics and related laws for reflective patient care in orthopedics and emergency medicine

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17676007 Practicum in community hospital 4 (0-12-0)  
PRAC COMM HOSP

PREREQUISITE: 17666003, 17666010

Working and learning as a member of multidisciplinary patient care team in a community hospital; application of principles of holistic care, health promotion, evidence-based medicine, medical ethics and related laws for reflective patient care in general medical practice

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## 2.3 BIOMEDICAL RESEARCH SUBJECTS

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17687001 Principles of biomedical engineering 3 (3-0-6)  
PRINC BIOMED ENG

[SAME AS BioMedEng 01317542]

General principles in designing medical instruments, biomedical sensors, amplifiers and signal processing, cell and muscular potentials and mechanical characteristics, electrocardiography and its measurement system, blood pressure sensors, heart sound sensors, blood flowmeters, impedance plethysmography, respiratory pressure and flow, respiratory gas concentration, blood-gas sensors, clinical laboratory measurements, radiography, magnetic resonant imaging, ultrasonic medical imaging, principles of pacemakers and defibrillators, therapeutic devices, safety and reliability of medical devices, electroshock protection.

#Advanced subject in biomedical sciences I 3 (x-x-x)

#Advanced subject in biomedical sciences II 3 (x-x-x)

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17687004 Seminars in biomedical research I 1 (0-1-2)  
SEM BIOMED RES I

Reading, understanding and presenting the technical papers in biomedical research

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17687005 Seminars in biomedical research II 1 (0-1-2)  
SEM BIOMED RES II

Reading, understanding and presenting the technical papers in biomedical research

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17687006 Seminars in biomedical research III 1 (0-1-2)  
SEM BIOMED RES III

Reading, understanding and presenting the technical papers in biomedical research

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# CHOOSE TWO ADVANCED SUBJECTS FROM THE FOLLOWING LIST

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17687002 Bioinformatics 3 (2-3-4)  
BIOINFORM

Application of computer science, statistics, mathematics, and engineering for biological data analysis and interpretation, high throughput technologies and big data, bioinformatics and sequence analysis, structural bioinformatics, systems biology, network and bioinformatics, biodiversity

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17687003 Stem Cell and Tissue Engineering STEM CELL TISSUE ENG	3 (2-3-4)
Stem cell biology, self-renewal and differentiation, stem cell plasticity; embryonic, somatic, induced-pluripotent stem cell, biomaterial, tissue regeneration, therapeutic application of stem cells; laws, regulation and ethical issues	
Medical Instrumentation MED INSTRUM	3 (3-0-6)
Sensors, electrodes, origins of bio-potential, measurement of flow and volume of blood, measurement of the respiration system, clinical laboratory instrumentation, introduction of medical imaging system and therapeutic and prosthetic devices	
Applications of Computers in Medicine APPL COM MED	3 (3-0-6)
Advantages and applications of digital computers for clinical medicine and research in biomedical science, bio-signal analysis, other related current research topics, conducting small projects of computer applications in medicine	
Statistical Data Analysis STAT DAT ANAL	3 (3-0-6)
Basic ideas of probability theory, combinatorics, random variables and functions of random variables, means, moments, and generating functions, order statistics and special distributions, inequalities and the central limit theorem, principles and engineering applications of statistical inferences; parameter estimation, confidence intervals, hypothesis testing, analysis of variance (ANOVA), linear regression	
Biomedical Signal Processing BIOMED SIGN PROC	3 (3-0-6)
Basic physiological signals, spectrum and acquisition methods, noise and interference on the signal, case studies on signal analysis in time domain, frequency domain and time-frequency domain	
Medical Image Processing MED IMG PROC	3 (3-0-6)
Algorithms in image reconstruction from projection; algorithms filtered-back projection, ART algorithms, Fourier algorithms; algorithms of cross-section image made from projection, image registration and 3-D modeling from medical slices.	
Biomaterials BIOMAT	3 (3-0-6)
Properties of materials used in surgical implants and medical devices, biocompatibility, degradation of materials by biological systems, biological responses to artificial materials.	
Mathematical and Computer Modeling of Physiological Systems MATH COMP MOD PHYS SYS	3 (3-0-6)
Fundamental principles in model development, applications of mathematical and computer	

physiological models, compartment modeling, covering fluid transport, mass transport by fluid flow, pressure-flow models, lung mechanics, fundamentals of respiratory system modeling, gas laws respiratory system modeling, neural modeling, ion transport and action potential, introduction to heat flow and thermal modeling, heat flow and thermal regulation, body fluid volume regulation, renal system modeling and glucose-insulin models.

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## 2.4 SELECTIVE SUBJECTS

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17666015 Selective clerkship I 2 (0-4-2)  
SELEC CLERK I

An elective study or practice in various clinical fields or related disciplines according to personal interest and for the benefit of professional and personal development

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17666016 Selective clerkship II 2 (0-4-2)  
SELEC CLERK II

An elective study or practice in various clinical fields or related disciplines according to personal interest and for the benefit of professional and personal development

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17676008 Selective practicum I 4 (0-12-0)  
SELEC PRAC I

An elective working and learning as a member of multidisciplinary patient care team in various clinical fields or related disciplines according to personal interest and for the benefit of professional and personal development

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17676009 Selective practicum II 4 (0-12-0)  
SELEC PRAC II

An elective working and learning as a member of multidisciplinary patient care team in various clinical fields or related disciplines according to personal interest and for the benefit of professional and personal development

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17687005 Biomedical research selective I 3 (0-6-3)  
BIOMED RES SELEC I

An elective study or practice in various biomedical research facilities according to personal interest and for the benefit of professional and personal development

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17687006 Biomedical research selective II 3 (0-6-3)  
BIOMED RES SELEC II

An elective study or practice in various biomedical research facilities according to personal interest and for the benefit of professional and personal development

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## 2.5 INDIVIDUAL RESEARCH AND THESIS

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17696001 Individual research I 2 (0-6-0)  
INDIVIDUAL RES I

Design and conduct individual research project according to personal interest and for the benefit of professional and personal development

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17696002 Individual research II 2 (0-6-0)  
INDIVIDUAL RES II

Design and conduct individual research project according to personal interest and for the benefit of professional and personal development

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17696003 Individual research III 2 (0-6-0)  
INDIVIDUAL RES III

Design and conduct individual research project according to personal interest and for the benefit of professional and personal development

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17696004 Thesis I 2 (0-6-0)  
THESIS I

Design concept, conduct and present preliminary results of individual biomedical research project

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17696005 Thesis II 5 (0-15-0)  
THESIS II

Conduct, conclude, and present results of individual biomedical research project

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17696006 Thesis III 5 (0-15-0)  
THESIS III

Conduct, conclude, present and publish results of individual biomedical research project

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# **ELECTIVE COURSES**

17616004 Biotechnology for better living 3 (3-0-6)

The subject is divided into four sections including medicine, food biotechnology, agriculture, and environment. At the first, medicine is which includes the topics of genetic engineering for disease prevention, forensic science, biosensor, human microbiome and live medicine, technology for vaccine development and gene therapy. Next is biotechnology for cooking. The third section, agriculture comprises genetically modified organisms and plant tissue culture. The last section comprises the topics of waste utilization and bioplastic.

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17616005 Medicinal Plants 3 (3-0-6)

Study the basic knowledge of medicinal plants, a brief history of medicinal plants discovery, basic phytochemicals, medicinal plants in primary health care and daily life, herb-drug interaction and reasonably selecting herb products from online advertising for self-medication.

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17616006 Living with Microbes 3 (3-0-6)

History and introduction of microbes; Basic microbiology and its techniques; What are Bacteria, Fungi, Virus, Parasite; Microbiome in Skin, Face and Armpits; Microbiome in Gastrointestinal tracts; Microbiome in Genital tracts; Microbiome as living drugs (alternative medicine); Antibiotics and how microbe resistance; Vaccines from microbes; Hot issues in microbial disease & technology

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17616008 Guardians of the body 3 (3-0-6)

This course is discussion-based that utilizes the knowledge of basic defensive mechanisms. Introduce the role of human immune responses in protection against infectious diseases and disorders. Learn and criticize about issues in movies, TV drama and news that involve the defensive processes and immune responses.

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17616009 World of insects 3 (3-0-6)

The subject is divided two modules. First module is the biodiversity including insect fauna, evolution, diversity and impacts and chemical attraction and communication. The second module is the topics with application and experiences in insects including archaeology, weapons, diets and entertainments. In addition, the topics are technology including insect technology and model. Also, medical areas are the forensic importance, dangerous insects (deadly and myiasis insects), and insect control.

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17616010 Principles of Medicinal Chemistry 3 (3-0-6)

This class will cover basic knowledge of drug actions and drug design. These include structural modifications of known active molecules and natural products to enhance the efficacy toward drug targets: receptors and enzymes, protein and its functionalities. The chemical based or bioassay guide-based approaches for lead optimizations will be also discussed in this class. The organic synthesis will be highlighted as the essential toolbox for the development of novel chemical entities. Materials and discussions from this class will offer the foundation of understandings for drug design and pharmaceutical industrial applications.

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17626175 Medicine and literature 3 (2-2-5)

Language and medical practice, medical narrative, medical aspects of classic literature, effective storytelling to enhance empathy in medical care, medical publishing, social media and mass media in medical education

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17646004 Self-discovery 3 (3-0-6)

Learn to know yourself better through various concepts of personality and to improve your relationship with your beloved one through science of love and sex. Also, vulnerable states to all risk factors related to deviance, crime and moral development

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17646006 Poverty, health and livelihoods 3 (3-0-6)

Poverty, health and livelihoods are some of the major issues affecting the world today. This course will focus on social, economic and health issues affecting communities globally. The course will be divided into three sections.

Section 1: Poverty in low, middle and high income countries. This section will review factors that drive poverty around the world.

Section 2: Will focus on health disparities in low, middle and high income countries and how these affect population in the various regions.

Section 3: The focus will be on livelihoods and what people do to make ends meet in low, middle and high income countries.

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