

# **Janaki Medical College**

(Operated by Ram Janaki Health Foundation Pvt. Ltd.)

**Affiliated to Tribhuvan University**

## **Curriculum for Bachelor of Medicine and Bachelor of Surgery (MBBS First Year)**

*Courtesy: National Centre for Health Professions Education, Maharajgunj, Kathmandu, Nepal: 2008*

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## **Curriculum Outline:**

This curriculum is community oriented, has integrated teaching learning activities and encourages self directed, community and problem-based learning.

The curriculum for the first year includes:

- Community Medicine
- Integrated Basic Medical Science
- Clinical exposure
- Communication Skills

To conduct integrated teaching based on organ systems, basic science faculty members coordinate periodic intra and inter departmental meetings in order to conduct correlation seminars and problem based learning.

### **Community Medicine includes:**

Basic Epidemiology, Biostatistics, Demography, Environmental Health, Nutrition, Health Education, Sociology and Anthropology, Family Health, Communication skills, Information Technology, Community Health Laboratory and Community Health Diagnosis.

### **Integrated Basic Science includes:**

Anatomy, Physiology, Pharmacology, Pathology, Biochemistry, Microbiology of structures and functions in Neurosensory and Musculoskeletal system, Respiratory, Cardiovascular and Gastro-intestinal and hepatobiliary system, Reproductive, Endocrine, Renal and Electrolyte systems.

**10.1A: Epidemiology**

General description of the course

This course of epidemiology is designed to equip the students with a comprehensive knowledge on the need, philosophy, concepts, strategy, methods and use of epidemiology. It is also designed to develop health research competencies and attitude to apply epidemiological principles in the community/individual health diagnosis and health care practices.

**General objectives**

Students will be able to

- define and measure health and disease and discuss its natural history, occurrence and causation;
- identify the health and non-health factors affecting the population exposed, the environment and ecosystem in which they live in, and the specific agents which influence or determine health and disease, as a basis for the health care of the communities;
- use epidemiology in understanding health problems and developing community health care for the entire population;
- organize control/preventive measures and appraise management of diseases and other health problems appropriate to the existing physical, eco-biological and sociocultural conditions; and
- appreciate designing and approaches to research

**Specific objectives**

Students will be able to

- describe the concept of epidemiology, historical development of epidemiology and practices and its use in health management and patient care;
- define health and disease, natural history of disease and models of disease occurrence and causation (epidemiological triad, wheel, web of causation and pie);
- explain the need and principles of classifying diseases;
- describe different sources of epidemiological data, their types, uses, reliability and weakness, and appraise the data critically;
- define infections, communicable/non-communicable diseases, case, host (primary and intermediate), agent, environment, carriers, parasites, vectors, reservoir, incubation period, latency, persistency, infectivity, antigenicity, virulence pathogenicity, saprophytes, eco-health;
- explain various terminologies used in the epidemiologic description of communicable and non-communicable diseases including type of epidemic; (common source, propagated and cyclical), endemicity, sporadic, pandemic epizootic, enzootic etc;
- explain mechanism of transmission under the following:
  - describe the processes of transmission of communicable diseases
  - explain host, parasite and the environment relationship
  - mention ways of breaking the transmission cycle
  - describe levels of prevention and discuss control and prevention of communicable diseases

- explain immunity and the role played by the body defense mechanisms in relation to
  - antigen and antibody
  - basic immuno-biology
  - active and passive, natural and artificial immunity
  - herd immunity
  - mechanism of immuno-compromised conditions
- define immunization, types of immunization, contraindication of immunization, immunization schedule in Nepal as a method of control;
- carry out epidemiological investigations of infectious and non-infectious disease and describe general principles of investigation of an epidemic with examples;
- discuss the measurement of disease
  - frequency measures (rate, ratio and proportion)
  - prevalence, incidence and other epidemiological indices
  - measures of association
- describe characteristics disease/health status in terms of persons, place and time:
  - importance and need for collecting information on the people/per affected with a disease.
  - role of intrinsic and extrinsic factors associated with person/s including ethnicity in disease distribution
  - intrinsic and extrinsic conditions of place and migration
  - role of place in disease occurrence
  - geographical distribution of diseases and comparison of disease occurs at international, regional and local levels;
  - seasonal clustering of disease
  - clustering and cyclic fluctuations of disease
  - secular trends of the disease
- describe the types and nature, and use of various epidemiologic studies; describe errors in epidemiological studies (chance, bias, confounding);
- describe the concept of cause and role of epidemiological studies to establish causal relationship in terms of relative risk, odds ratio; types of association and predictive values of such associations;
- describe the strategies of epidemiology under the following:
  - explain the ways and means of assembling the facts on the types of people affected with a disease and various circumstances in which it occurs,
  - discuss the hypothesis regarding the distribution and cause or determinants of the disease/problem (s) in the population or area;
  - formulate the hypothesis and test it scientifically or epidemiologically (descriptive, comparative, analytical, interventional and experimental epidemiology); and
  - perform the review, appraise, present, propagate and apply various epidemiological studies.

### **Recommended textbooks**

1. Bonita and Beaglehole. Basic Epidemiology. WHO Publications
2. Park JE, Park K. Textbook of Social and Preventive Medicine
3. Lilienfield & Lilienfield Fundamentals of Epidemiology
4. Robert H Fletcher, Suzanne W Fletcher and Edward H Wagner, Clinical Epidemiology, Second Edition, Williams and Wilkins 1988

**10.1B: Biostatistics and Research****General Description of the Course**

This is a basic introductory course in fundamentals of biostatistics and medical statistics designed to meet the needs of medical graduates with emphasis on numerical problems on clinical practice and community health. It attempts to provide a broad perspective view of the application of statistical methods in biomedical and health problems including simple theories of sample surveys and probability and main focus on techniques of collecting reliable information of health problems and health services in the community and statistical presentation and interpretation of the findings of collected data. It will also try to introduce the computer skills in statistical analysis and data presentation.

**General Objectives**

Students will be able to

- process, analyze and interpret the available and collected data in health and medical fields by using appropriate statistical methods and computer skills;
- apply the statistical methods in managing health , biomedical problems and project the statistical trends by time and space; and
- plan and conduct an epidemiological investigation or a small scale heal research

**Specific and Behavioral Objectives:**

Students will be able to

- define statistics and explain its scope, functions, limitations and usefulness
- state and explain the role of Biostatistics in the community medicine and health sciences;
- explain the significance and use of different branches of statistics in investigation of community health and biomedical problems in public health c medical research;
- collect and record statistical information on medical and related fields from primary and secondary sources viz census, vital registration, ad-hoc surveys, population registers, hospitals records, medical journals and bulletins;
- process data including the determination of frequency distribution, presentation statistical data diagrammatic and graphic forms as simple, multiple, subdivided diagrams, pie diagram, cartograms, pictogram, histogram frequency cu frequency polygon, cumulative frequency curve, scattered diagram and give elementary interpretation of the data including simple analyses of tables, charts graphs;
- compute different rates and ratios of mortality, morbidity and fertility measures
- state and compute different measures of central tendencies - mean, mode, median and identify the requisites of an ideal average and its merits and demerits;
- state and compute different measures of location - quartiles, deciles and percentiles
- state and compute different measures of dispersions like range, standard deviation, variance, co-efficient of variation and identify the requisites of an ideal dispersions
- explain the concept of probability and chance in regard to biomedical applications such as diagnosis of cases, recovery from diseases (efficacy of treatments): enunciate the simple additive and multiplicative laws of probability;



- define and state the properties of Binomial, Poisson and Normal probability distributions and identify the parameters of these distribution and solve numerical examples;
- define concept of correlation and state the properties of correlation coefficients and compute the Pearson correlation coefficient and Spearman rank correlation coefficient and explain its meaning and solve numerical examples
- explain concept of regression analysis for two variables and compute the regression coefficients for simple linear regression equations and explain the cause and effect relationship between two variables;
- describe hypothesis and perform tests of significance under the following:
  - define hypothesis
  - formulate a statistical hypothesis
  - differentiate null hypothesis from alternative hypothesis
  - define Type I and Type II errors in testing of hypothesis/level of significance
  - conduct statistical tests of significance, Z-tests and t-test for one sample and two
  - explain samples, chi square-test for proportion, goodness fit and independence or association, test of correlation coefficient and draw inferences and solve numerical examples
- explain sampling theory under the following:
  - define population, sample, sampling unit, sampling frame
  - describe sample survey and census, and state the relative merits and demerits of sample versus census
  - explain the criteria for selecting appropriate sampling design
  - differentiate between probability and non-probability sampling
  - describe accidental sampling or convenience sampling, purposive sampling or judgmental sampling quota sampling and snow balling sampling as non-probability sampling
  - describe simple random sampling, stratified random sampling, systematic sampling, cluster sampling and multi-stage sample as probability sampling
  - explain the meaning of sampling errors and the sample size
  - describe non-sampling errors that may occur in observational data
- describe research and its use in medicine under the following:
  - list the types of research
  - describe the steps necessary for conducting a research
  - write a research protocol
  - frame research tools - questionnaire, checklist, guideline
  - conduct a simple scientific research
  - interpret the results
- familiarize with bioinformatics under the following:
  - write and present reports using MS Office
  - retrieve subject matter from CD Rom, internet, websites
  - apply computer skills in data processing and analysis: EPI- INFO and SPSS

**Recommended Reference Books:**

1. Hill AB. Principles of Medical Statistics, BI Publications, New Delhi
2. Mahajan BK. Methods in Biostatistics for medical students and research workers; Jaypee Brothers, New Delhi

**10.1C: Demography General Objectives**

The course is designed to help students understand population characteristics and population dynamics in relation to health services and development needs. It will also enable the students to understand the socio-economic, cultural, and eco-biological determinants of demographic status and its trend. The course also aims to enable the students to use different demographic tools in analyzing health problems and collect demographic information necessary for designing and implementing health programs.

**Specific objectives****1. Sources of demographic data**

Students will be able to

- identify different sources of demographic data on population structure, composition and distribution of the community;
- describe method, strength and weaknesses of these sources;
- use these sources for the collection of demographic data.

**2. Population structure and characteristics**

Students will be able to

- analyze the composition of population, construct Population Pyramid, develop concept of Young and old population;
- identify the problems due to ageing of population;
- describe and calculate Dependency Ratio; Masculinity Ratio, Sex Ratio.

**3. Fertility and its measurement**

Students will be able to

- identify the factors that influence the size and composition of population,
- explain the simple measures of fertility such as: Crude Birth Rate, General Fertility Rate, Age Specific Fertility Rate, Total Fertility Rate, Child Women Ratio,
- describe the concept of Baby Boom Syndrome, Baby Bust Syndrome,
- identify the determinants of fertility,
- describe the process of standardization of birth rates

**4. Reproduction and its measurement**

Students will be able to

- explain the concept of Reproduction rates, Replacement level fertility, Population Momentum and Contraceptive prevalence rate.

**5. Mortality and its measurement**

Students will be able to

- describe the simple measures of mortality such as: Crude Death Rate, Age Specific Death Rate, Infant Mortality Rate, Neo-natal Mortality Rate, Maternal Mortality Ratio,
- identify the determinants of fertility
- describe the process of Standardization of Death Rates and the concept of Life expectancy.

## **6. Migration and its measurement**

Students will be able to

- explain the common terminology of migration,
- describe the simple measures of migration such as: In migration rate, Out migration rate, Gross migration rate and Net migration rate,
- identify the determinants of migration

## **7. Population Projection**

Students will be able to

- describe the concept of Balancing Equation Method, and project the population by Mathematical Methods (Arithmetic Growth Model, Geometric Growth Model Exponential Growth Model),
- identify the demerits of one method over the other,
- explain the concept of Population Doubling Time

## **8. Population Theories**

Students will be able to

- critically analyze the Malthusian Population Theory and the Demographic Transition theory

## **9. Population Policy**

Students will be able to

- describe the purpose of population theory,
- identify the main content of population theory,
- critically analyse the recent population of Nepal as compared with world population policy.

## **10. Concept of Human Development Index**

Students will be able to

- explain the concept of Human Development Index, understand and interpret it

## **Recommended Books**

1. Bhende, AA and Kanitar T. Principles of population studies. Himalaya Publishing House, Bombay
2. Misra BD. An introduction to the study of population” South Asian Publishers Pvt. Ltd, New Delhi
3. Mahajan BK. Method in Biostatistics. Jaypee Publishers, New Delhi
4. Shryock, HS; Siegel JS; and Associate. The methods and materials of Demography. US Bureau of Census, Washington DC.
5. Cox RC. Demography. Cambridge University Press.

**10.2A: Health Promotion and Education****General description of the course:**

The role of human behavior is fundamental for the achievement of preventive, promotive curative and rehabilitative objectives. The rationale behind designing this course is that the health and medical care setting such as hospitals, nursing homes, private clinics, and health centers or health projects where there are probabilities of utilizing medical graduates, should have health education activities as an indispensable component of total medical care. Since the MBBS graduates are more likely to work in these settings, they need to be equipped with the basic concept and components of patient health education so as to facilitate health education activities in the medical care settings. Hence, this course is basically focused on patient-health education management and applied to health and medical care settings in general and patient in particular.

The course is divided into 6 units and behavioral objectives are set for each unit separately.

**General objectives:**

The students will be able to comprehend the role of patient health education in medical care settings and carry out patient counseling and education activities in a team approach.

**Specific objectives:****Unit I: Introduction**

Students will be able to

- describe the meaning of health promotion with due focus to Ottawa charter and Jakarta declaration as applied to health promoting hospitals/ Medical care settings.
- describe aim, objective and principles of health education by analyzing various definitions of health education, particularly those propounded by G. W. Stewart, Dorothy Nyswander, WHO scientific group and SOPHE - AAPHER
- explain the concept, principle and practice of patient health education and counseling for compliance and patient satisfaction
- describe the place and opportunities of health education in health and medical services;
- describe scope of health education in:
  - schools
  - work sites
  - family
  - community
  - health and medical care settings, such as hospitals, health centers, nursing homes, private clinics, and health care projects.

**Unit II: Health education in health and medical care settings (HMCS)**

Students will be able to

- explain the concept of facilitation of health education in health and medical care settings (HMCS);
- describe the role and functions of health and medical care providers (HMCP) for facilitation of patient health education as a planner, counselor, a facilitator or a

- monitor;
- list and explain the following functions of health and medical care providers (HMCP):
  - risk assessment and identification of patient's needs/problems;
  - health education planning and facilitating functions;
  - health education counseling function
  - health education monitoring functions.

### **Unit III: Patient health education counseling (PHEC), planning and facilitating**

Student will be able to

- identify health promotion and education need in the medical care settings through qualitative approaches - Participatory appraisal such as Participatory Learning Actions and Focus Group Discussions
- explain the concept of patient counseling (PC) as one of the strategy for behavior change;
- list and explain the essential traits required among HMCPs to carry out patient education;
- demonstrate the process of planning, implementing patient education/counseling in HMCS;
- describe the need of assessing the effectiveness of health education/counseling activities in the HMCS.

### **Unit IV: Methods and media of health education/counseling in medical care setting**

Student will be able to

- list the patient education/counseling methods appropriate for use in HMCS;
- appreciates the role of group dynamics and group process for conducting effective group discussions
- describe the nature, process and limitations of interview, counseling and group discussion methods;
- explain the selection criteria for interview, counseling demonstration and group discussion methods of health education;
- demonstrate the process of patient education/counseling methods;
- list the health education materials and equipment appropriate for health education in HMCS.

### **Unit V: Communication in patient education process**

Students will be able to

- explain effective interpersonal and group communication with patient and patient parties;
- define communication, its elements and principles for effective communication;
- describe interpersonal and group communication barriers and the ways to overcome the barriers in terms of:
  - inadequate and misleading perception of patient's own

- problems,
- offensive behavior,
- message distortion, communication noises,
- cultural difference between providers and patient/patient parties, and
- concept of activated patient and compliance tendency.

## **Unit VI: Practice of health promotion and education in a hospital setting**

Students will be able to

- assess the existing situation and prepares an annual plan of action for health promotion education with the medical team from patient and providers perspective with due provision of regular review monitoring in a hospital setting.
- conduct participatory learning action (PLA) process in the medical care setting: conducts successful group discussions and patient counseling
- prepare and demonstrate proper use of some of the selected health education materials such as pamphlet, Flash cards, display board and electronic media.

### **Recommended textbooks**

1. Pradhan, Hari Bhakta, Textbook of Health Education, Educational Publishing House Kathmandu
2. Ramchandra L, Dharmalingam T., A Textbook of Health Education, Vikas Publishing. New Delhi
3. Lawrence Green et al. Health Education a diagnostic and planning approach - PRECEDE and PROCEED Framework
4. Ottawa Charter and Jakarta Declaration of 1986 and 1997
5. Bedworth David & Bedworth A. Health Education: A process of human effectiveness. Harper and Row, New York, 1978.
6. Guilbert, JJ, Educational Handbook for Health Professional, Geneva: WHO, 1977

**10.2B: Medical Sociology and Anthropology****Course Description**

The course is designed to provide fundamental concepts in medical sociology and anthropology and to equip students with an ability to apply them in managing patient care and health services. The course imparts the basic concepts and understanding in sociological/anthropological theories, culture and belief system. The course provides a respective on the importance of health politics and the health ethics.

**General Objectives**

Students will be able to

- identify the general role of individual, family and community and sociological and anthropological variables determining the health status of the people;
- analyze social relationship in practice of health and medicine and identify the sociological and anthropological determinants of the problems, management and outcomes;
- collect, process, analyse, present and use subjective and objective data to identify the community structure, expresses/assessed needs of the patient and community;

**Specific objectives****Unit I Basic Concepts**

Students will be able to

- explain the basic concepts of Sociology and Anthropology and appreciate its application in medical field
- explain the terminology used in Sociology and Anthropology (for example social status, role, social stratification, cultural relativism, social process, ethnocentrism, norms, values, customs, belief systems, cultural- lag, ethno-medicine, self- medication, ethno psychiatry) and apply them in medical practice
- define and explain: nature, scope, and development of Medical Sociology and Medical Anthropology and its application in medical sector.
- trace the genesis, development and contemporary status of society and health issues.

**Unit II Culture and Health**

Students will be able to

- explain the meaning, definition and characteristics of culture applied to medical practice.
- identify the Personalistic and Naturalistic medical system
- appreciate the value of Self-medication/alternative medication and other prevailing health care practices and its importance.
- appreciate and apply social importance of indigenous health care system and health care provider.
- analyze cross-cultural examples including gender differences in these cultures on the

concept of illness and healing practices in Nepal.

### **Unit III Doctor-Patient Relationship**

Student will be able to

- describe the meaning and interpretation of doctor-patient relationship
- explain reciprocal roles of doctor-patient.
- apply Parson's sick role model and Szaaz and Hollender's basic model of Doctor-Patient relationship
- identify barriers and possible remedies in effective Doctor-Patient relationship

### **Unit IV Health Politics**

Students will be able to

- explain the concept and interpretation of health politics.
- describe Comprehensive and Selective Primary Health Care and political Camps.
- analyze the Impact of politics on health scenario.
- identify the legal provisions of health in Nepal

### **Reference Books:**

1. Dixit, Hemang. Nepal's Quest for Health, Educational Publishing House, Kathmandu.
2. Foster, George M., and Anderson, Barbora, G. Medical Anthropology
3. Freeman, E. Howard, Levine, Sol, and Reeder G. Leo (edited 1979): Handbook of Medical Sociology; Third Edition, Prentice-Hall, Inc. Englewood Cliffs, New Jersey
4. Gartoulla, Ritu Prasad. An introduction to Medical Sociology and Medical Anthropology, RECID/N, Kathmandu.
5. Gartoulla, Ritu Prasad. Therapy Pattern of Conventional Medicine, RECID/N, Kathmandu.
6. Mechanic, D. Medical Sociology: A selective view, New York, The Free Press.
7. Werner, D. and Bower W. Helping Health Workers Learn. Palo Alto, CA, Hesperian Foundation.



**10.2 C: Environment and Occupational Health****General Description of the course**

The course consists of two major components: i) environmental health and ii) occupational health. It aims at providing theoretical and practical knowledge on the various components of environment health and occupation health. The students will be able to translate the ecosystem concept to improve the environment and occupation health for healthy living in the community. The course helps the students learn basic principles of environmental health and occupational health in a holistic and integrated manner to solve and mitigate the problems related to human health problems.

**Specific objectives:****I. Environmental Health**

Students will be able to

- explain the concept and relevance of environmental health and environmental sanitation
- describe the key environmental issues.

**2.1 Water**

Students will be able to

- describe the sources of water.
- analyze the relevancy of water quality and quantity
- explain the concept of safe water, water quality standard/ water quantity guideline
- explain water quality indicator parameters
- explain the implication of water quality map in the community
- explain the concept of water purification and its types and implication
- describe water related diseases and its prevention

**2.2 Waste**

Students will be able to

- describe the types of wastes and classify the wastes.

**2.2.1 Solid waste**

Students will be able to

- describe the types of solid wastes
- explain the waste management practices existing in Nepal
- analyze the waste types and their impact on health

## **2.2.2 Liquid Waste**

Students will be able to

- describe the types of liquid waste
- explain the liquid waste management practices existing in Nepal
- explain the liquid waste quality and its impact on health

## **2.3 Air Pollution**

Students will be able to

- describe the air pollution
- explain the sources of air pollution
- explain the types of air pollution
- describe air pollutants and its impact on health
- explain air pollution mitigation measures

## **2.4 Housing/Settlement**

Students will be able to

- define housing
- describe the effect of poor housing
- explain standard of housing
- explain the concept of settlement
- explain the rural settlements/ urban settlements
- explain urban development and its consequences
- explain noise pollution and its health impact

## **2.5 Food**

Students will be able to

- explain the concept of food security
- explain food adulteration and food storage
- explain principals of food handling and food supply
- explain about the mycotoxin in food: Aflotoxin; Fusarium derived toxin and its prevention; Zeralenon etc.
- describe about food law in relation to food hygiene

## **2.6 Ecology**

Students will be able to

- explain the concept -of ecology, ecosystem, biosphere, energy cycle, interdependence of environment, plant, animal and human health.
- describe the people's participation in ecological preservation.
- Explain the management of environmental health
- describe the role of governmental and non-governmental agencies and communities in environmental preservation and promotion of environmental health.

### 3. Medical Entomology

Students will be able to

- define medical entomology
- explain the nature of important insects and arthropods as vector agents in relation to health explain the mode of disease transmission and preventive methods of the following insects:
- describe the medical importance of Bed-bugs, Cockroach, mosquitoes, fleas, sandflies, domestic flies, ticks and mite.

### II. Occupational Health

Students will be able to

- define occupational health and safety, historical development, principles, concept and scope of occupational health
- enumerate and discuss occupational health hazards in agriculture
  - Zoonotic and insect-borne diseases (Tetany, Bovine TB, Anthrax, Plague, Rabies)
  - Physical health hazards (Heat, cold, light, moisture, noise, vibration) o
  - Chemical hazards (Acid, Alkali, Pesticides)
  - Biological hazards (Bacteria, Virus, Clamidia, fungus, parasites, insects)
  - Mechanical hazards (machineries, trauma)
- discuss industrial occupational hazards such as
  - Dermatological health problems (Primary, Secondary, Primary with systemic illness, Carcinogenic)
  - Respiratory health problems (Coalmiac pneumoconiosis, Asbestosis, Silicosis, Cold and cough, Bassynosis, Baggasosis, Bird fancier's lungs, Farmer's lung)
  - Cardiovascular problems (Cor pulmonale)
  - Problems of nervous system (peripheral, central)
  - Occupational liver disease (Cirrhosis, Hepatitis, Hydclidosis, Carcinoma)
  - Renal disease (Carcinoma)
- carry out occupational health risk assessment and its management (man and environment, man and machine, man and man, principles and procedures of management)
- explain ergonomic hazards and their control (Musculo-skeletal hazards, relationship between biological and mechanical strength, Engineering and administrative control of ergonomic hazards)
- explain regulations regarding the occupational hazards
  - Workers compensation, (general concepts, procedure, requirement, types of compensation,
  - Labour Act of Nepal (Principles, procedure, labour right, compensation)

### References

1. Abbasi, SA. Environmental Pollution and its Control. India. Cogent International, 1998.
2. Bryan, FL. Hazard Analysis Critical Control Point Evaluations. Geneva. WHO, 1992
3. Gleeson C and Gray. The Coliform Index and waterborne Disease, Problem of

- microbial drinking water assessment. London. E & F. N. Spon, 1997.
4. Chapman D. Water Quality Assessment. London, Chapman and Hall, 1992.
  5. Cheesbrough M. Medical Laboratory Manual for Tropical Countries. Vol. I and II. ELBS Publication, 1993
  6. Cooper P F et al. Reed Beds and constructed Wetlands for Wastewater Treatment. Swindon: WRc pic, 1996.
  7. Lucas, AO and Gills HM. Preventive Medicine for the Tropics. London: Edward Arnold, 1990.
  8. MOPE/ICIMOD/UNEP. Nepal: Status of Environment Report 2001. Kathmandu.
  9. Park, K. Preventive and Social Medicine. India: Banarsidas Bhanot, 1997
  10. Peavy HS, Rowe DR and Tchobanoglous G. Environmental Engineering. McGraw-Hill International Editions, 1985.
  11. Pradhan, PK. (2003), Manual for Urban Rural Linkage and Rural Development Analysis. Kathmandu: New Hira Book Enterprises.
  12. Santra, SC. Environmental Science. India: New Central Book Agency, 2001
  13. Tebbutt, THY. Principle of Water Quality Control. Pergaman Press, 1992.
  14. WHO/WMO/UNEP (1996), Climate Change and Human Health. Geneva: WHO
  15. Hunter D. Diseases of Occupation
  16. Jeyaratnam J. (ed). Occupational Health in Developing Countries
  17. WHO. Early Detection of Occupational Diseases
  18. Labour Act and Regulations of Nepal

**10.2D: Family Health****Course description**

The family health component of the curriculum is designed to increase the knowledge and competency of students in addressing issues in family health. The course is designed to help the students understand family health issues with a holistic rights based approach and life cycle perspective as well as apply them in addressing the problems of family health in a comprehensive manner.

**General objectives**

At the end of the course the students will be able to explain the concept of family health, its determinants and needs; the life cycle perspective with major issues, their determinants, and appropriate measures to address them at different stages of life and importance of nutrition in health, nutritional requirement at different stages of life, breast feeding and supplementary feeding, nutritional problems, and measures to address them, anthropometric parameters, Governmental policy and strategies in nutrition.

**Specific objectives:****Unit 1: Concept of Family Health**

Students will be able to

- explain concept on family health
- describe holistic - biomedical and bio-psycho-social model of family health
- describe functions of family and its relation to health care utilization (for example, sickness role, interactions among family members in health disease, counseling and rehabilitation)
- Describe determinants of family health (Living and working conditions; physical environment, personal health practices, etc.)
- explain the concept and social construct of gender, interpret gender as determinant of health.
- describe the problems faced by the family and their impacts on family health, for example, Teenage marriage and its consequences; Broken and dysfunctional families; Disability and rehabilitation; Substance abuse; Gender based violence including girl trafficking
- identify the role of medical professional in addressing these family health problems

**Unit 2: Family Health in Life Cycle perspective****2 1. Child health**

Student will be able to

- analyze the child health situation of the region and Nepal
- describe the causes and childhood morbidity and mortality - neonatal, infancy an under five year old children.

- explain the mother's health and its relation with child health & describe the child survival strategies historical perspective and the current approaches
- identify the social problems in children (child abuse, abandoned or street children child labour, conflict and refugee situation and its impact on child health)
- describe importance and methods of child health surveillance
- analyze the importance of child rights and protection in child development aspect

## **2.2. Adolescent Health**

Students will be able to

- identify the adolescent health needs for growth and development.
- analyze adolescent's problems in Nepal, including teenage pregnancy, STDs, drug abuse, alcoholism, smoking, accidents, violence, crime etc.
- describe approaches to address the adolescent health problems, life skill education and national adolescent health strategy

## **2.3. Reproductive Health**

Students will be able to

- describe the evolution of the concept of reproductive health, its components and relevance.
- explain the major problems related to reproductive health (STD including HIV/AIDS)
- describe the approaches to address the reproductive health problems

## **2.4. Maternal Health**

Students will be able to

- describe maternal health situation (morbidity and mortality)
- identify the approaches to address the maternal health problems

## **2.5. Aging and Health**

Students will be able to

- identify the issues of healthy aging
- identify the major health problems and their magnitude
- describe approaches to address the health of elderly people

## **2.6. Family Planning and Contraceptive Use**

Students will be able to

- describe types and recent trends in contraception, their mode of action, efficacy indications and contraindications. Importance of counselling and follow-up calculation of indicators that are commonly used.
- analyse the importance of FP program in health (social, economic, environment, quality of life etc)
- discuss factors associated with use and non use of contraceptives, benefit, side effects, and contraindication of contraceptive devices
- explain approaches in Family Planning program: Right-based, Responsible parenthood

## **Unit 3: Food and Nutrition**

Students will be able to

- describe nutrition and importance of food and nutrition
- explain the metabolism of nutrients, carbohydrates, proteins, fat, minerals and vitamins
- analyze the nutritional value of locally available food, cereals, pulses, fruits, vegetables, meat, fish, egg, milk and dairy products
- discuss the food hygiene and effect of unhygienic food
- describe the food processing, its effects on nutrients of food processing and storage
- describe the food adulteration and health hazards
- discuss mycotoxin and nutrition

### **3.2 Nutritional requirement at different stages of life**

Students will be able to

- identify balanced diet and its importance for different age, sex, occupational groups
- analyze and describe nutritional needs during different stages of life: infancy, adolescence, pregnancy, lactation and old age

### **3.3 Breast feeding**

Students will be able to

- describe the physiology of breast milk production
- discuss the advantages of breast-feeding
- explain artificial feeding and its impact on health
- analyze breast-feeding in different health conditions including HIV/ AIDS

### **3.4 Supplementary feeding**

Students will be able to

- describe the types and approaches and importance of supplementary feeding

### **3.5 Problems related to nutrition and health**

Students will be able to

- describe the malnutrition, its types, magnitude and management
- analyze the poverty, infection and malnutrition

### **3.6. Anthropometric measurement**

Students will be able to

- identify the indicators of nutritional status
- describe and apply the measurement technique: weight for age, height for age, weight for height and mid arm circumference
- interpret the anthropometric findings

### **3.7. Nutrition plans, policies and program in Nepal**

Students will be able to

- describe the national policy and strategies in nutrition
- analyse nutritional programs conducted by GO, NGO/ INGO
- describe and analyse food supplementation programs
- discuss the legislative issues and quality control regarding food production,

transportation, marketing and consumption

#### **Unit 4. Nutritional survey**

Students will be able to

- identify the nutritional survey in Nepal
- analyze the nutritional status of Nepalese people and current nutritional studies and research

#### **Reference books**

1. Adhikari RK. and Krantz ME. Child Nutrition and Health. Health Learning Material Center, TU, loM
2. King FS and Burgess A. Nutrition for Developing Countries. Oxford Medical Publication
3. The Health Aspect of Food and Nutrition, WHO
4. Vidhybhusan. Fundamentals of Sociology
5. Nepal Demographic and Health Survey, 2006



**10.3A: Integrated Community Medicine Practical****Course description**

Community Medicine III is an integrated course comprising several sub-specialties within community medicine course at large. This course is designed to enable the students understand the concept of Primary Health Care (PHC) and concepts of community diagnosis as well as to help them acquire skills to apply basic methodologies of community medicine - epidemiology, biostatistics, demography, family health, environmental health, health education, and medical sociology/anthropology. The course will also be helpful in earning from the community.

The course consists of the following components

- Primary Health Care (PHC)
- Community Health Diagnosis (Theory)
- Community Medicine (Integrated Practical)
- Community Health Diagnosis (Field)

**General objectives:**

The course aims to enable the student to

- explain the concept and relevance of primary health care
- describe community diagnosis
- acquire basic skills of conducting community diagnosis

**Specific objectives:****I. Primary Health Care**

The students will be able to

- describe the historical background of Primary Health Care.
- explain the principles of Primary Health Care according to Alma-Ata Declaration.
- discuss health as the right and responsibility of all irrespective of gender, ethnicity, religion, and ideological and other beliefs.
- explain the process of marginalization.
- describe the equity and social justice in health, priorities for the poor, deprived, underprivileged, and underserved.
- describe implementation of Primary Health Care in Nepal.

**II. Community Health Diagnosis (Theory)**

The students will be able to

- describe concept of Community Medicine.

- describe concept and objectives of Community Health Diagnosis
- describe differences and similarities between Community Health Diagnosis and clinical diagnosis
- discuss the importance and relevance of Community Health Diagnosis for physicians
- explain different components of Community Health Diagnosis
- describe different approaches to Community Health Diagnosis
- describe different method/techniques (observation, interviews, focus group discussion, participatory appraisal, etc.) and tools (observation checklist, questionnaire, discussion guideline, etc.) used in Community Health Diagnosis.
- explain necessity and ways of prioritization of the problems in the community.
- describe concept of micro health project in relation to Community Health Diagnosis

### **III. Community Medicine (Integrated Practical)**

The students will be able to

- develop different tools of data collection (questionnaire, observation checklist, focus group discussion guidelines, interview guidelines, etc.)
- apply method/techniques of data collection (interview, focus group discussion, observation, participatory appraisal)
- estimate/calculate different health indicators and epidemiological measurements.
- assess nutritional status of children under five by anthropometric measurements (height for age, weight age, weight for height, and MUAC)
- prepare weaning foods including Sarbottam Pitho
- assess dehydration and prepare ORS and other food base rehydration solutions
- acquire basic skills on environmental health
- demonstrate basic skills on communication and health education
- calculate/estimate basic indicators on population studies.

### **IV. Community Health Diagnosis (Residential field)**

The students will be able to

- communicate with the people in relation to the health problems in the community in socio-cultural context of the community
- apply different methods to collect data required for community diagnosis.
- use different tools of data collection that is required for community diagnosis
- analyze and interpret the data to identify the problems and ways of their solutions in the community
- prioritize the problems based on observed and felt needs and available resources.
- dissemination of the findings of community diagnosis process by presentation to the community and in the campus.
- identify the community resources to address the problems
- plan and implement a micro-health project based on prioritization of needs with the participation of the community.
- write a report of community diagnosis.

## **Methods**

Teaching learning methods of this course include theory lectures, laboratory (practical) and field works in the community.

Laboratory works - Students will be divided in to several groups. Each of the groups will be given assignments and guided by the teachers to assist and monitor the performances of the students. The students will maintain individual note on the practical works performed.

Community Medicine Diagnosis (Field) - include the following processes:

1. Selection of the field
  - Orientation to the students
  - Orientation about the community they will be posted
  - Orientation about process of field work
  - Development of the specific objectives by each group
  - Development and pretest of specific tools for data collection,
  - Development of work plan in the community
  - Organize logistics
2. In the community - rapport building, meeting with the people, data collection, preliminary analysis, community presentation, prioritization of the problem, implementation of micro health project
3. Presentation in the campus
4. Submission of the report to the Department of Community Medicine and Family Health.

## **Reference books**

1. Hale, C. Shrestha IB and Bhattacharya A. Community Diagnosis Manual, HLMC Institute of Medicine, 1996
2. Field Training Manual. FESU, Institute of Medicine, 1995 :
3. Bennette FJ. Community Diagnosis and Health Action; A manual for tropical and rural areas, Churchill Livingstone 1979.

**11.1A. GENERAL CONCEPTS:****GENERAL ANATOMY**

Students will be able to

- describe the vertebrate body plan highlighting the bilateral symmetry and regional differentiation into head, neck, trunk and caudal region;
- explain the evolution of the notochord, nervous, digestive, renal, reproductive, and musculo-skeletal system of the body;
- explain evolution of coelomic cavities in relation to major organs in the body; visualize the trunk as a double tubular system:
  - outer part that consists of notochord, neural tube, musculature of body wall and parietal peritoneum;
  - inner part consists of the gut system connected with the outer tube by dorsal and ventral mesenteries (visceral peritoneum);
  - note the outgrowths of digestive system and projections of other organs into the body cavity in section;
- discuss evolutionary changes in population in relationship to genetic mutation;
- explain the terms 'phenotype' and 'genotype';
- explain Mendelian inheritance and correlate with autosomal and sex linked dominant and recessive diseases.
- classify chromosome, mention its parts, mention the structural and numerical anomalies of chromosomes with examples.
- mention briefly on pedigree charting and genetic counseling.
- describe the gross cell structures and their functions;
- describe the process involved in cell division;
- describe epithelium and tissue;
- classify epithelial cells based on the shape and number of layers of cells;
- define endothelium and mesothelism;
- explain the non-epithelial tissues;
- classify glands;
- define 'exocrine' and 'endocrine' glands; give the morphology of exocrine glands.

**Human anatomy**

Students will be able to

- define the terms 'anatomie' and dissecare;
- list the subdivisions of gross (macroscopic) anatomy;
- define anatomic terminologies;
- explain anatomic adjectives used as pairs of opposites;
- explain the anatomic movements usually described as pairs of opposites;
- describe the skin in respect of its functions, divisions, cleavage lines, innervations,
- significance in general medicine, general and plastic surgery, dermatology and neurology;

- describe different layers of skin; describe skin appendages;
- describe vascular and nerve supply to the skin;
- correlate the importance of knowing these structures in relation to diseases like leprosy, eczema, bullous diseases;
- explain fascial layers and their functions;
- describe mammary gland as a part of the superficial fascia, its blood supply, lymphatic drainage, development and anomalies.

### **General Embryology**

Students will be able to

- explain the significance of the study of embryology in the different disciplines of medical sciences;
- describe the process of maturation of gametes;
- describe the process of fertilization and zygote formation;
- describe different stages of embryonic development;
- explain development of foetal membranes from the zygote;
- describe amnion, yolk sac, allantois, chorion, foetal part of placenta, body stalk;
- describe the placenta, give its classification and functions;
- describe the umbilical cord including the fate of the constituents of the umbilical cord;
- explain the anomalies in relation to amniotic fluid, yolk sac, allantois, chorion, placenta and umbilical cord.
- describe teratogenesis and list teratogenic agents.

### **GENERAL PHYSIOLOGY.**

#### **General Concepts:**

Students will be able to:

- describe general functional organization of human body.
- define common physiological terminologies with examples.
- describe briefly the concept of differentiation of cells/tissues for special function.
- define homeostasis and give suitable examples.
- describe the concept of control system, positive and negative feedback mechanisms with suitable examples.
- describe the functions of different cellular organelles.
- describe the body fluid compartments and their composition.
- describe the structure of cell membrane and describe the different transport mechanisms occurring at the cell membrane.
- describe inter-cellular connections and inter-cellular communication.
- describe membrane electro-physiological properties including resting membrane potential, sodium- potassium pump, Nernst equation, action potential and its ionic basis, propagation of action potential, Goldman equation.
- define stimulus, excitability, conductivity, refractory period, chronaxie, rheobase, utilization time, strength duration curve, and spatial and temporal summation.
- differentiate between local potentials and action potentials.
- describe compound action potential and difference between monophasic and biphasic

action potentials.

- describe Wallerian degeneration and changes in the proximal segment when a neuron is sectioned.
- describe the main theories advanced to explain ageing process.
- describe the concepts of yoga, and its different techniques

## **Blood**

Students will be able to

- describe composition and functions of blood, principles underlying measurement of blood volume.
- describe plasma proteins: concentration, types and functions including colloid osmotic pressure, Starling forces at the level of capillaries.
- describe erythrocytes -morphology, functions, fate, normal count.
- describe erythropoiesis including the regulating factors.
- define PCV (hematocrit), ESR, blood indices (MCV, MCH, MCHC), and osmotic fragility.
- describe leukocytes: classification, morphology, functions, development, and normal counts.
- describe the principles underlying blood transfusion: blood groups, Landsteiner's law, cross matching, inheritance, indications and hazards of blood transfusion.
- describe the physiology of coagulation, tests for clotting, clot retraction, fibrinolysis, and anticoagulants.
- describe the physiological basis of acquired and natural immunity.

## **Disordered functions**

Students will be able to explain the physiological basis of:

- conduction blocks in multiple sclerosis and other neuropathies.
- anaemia, polycythemia, thrombocytopenic purpura.
- bleeding and clotting disorders.
- erythroblastosis fetalis, hemolytic disease of the newborn.
- acute renal shutdown in severe blood transfusion reaction.

## **GENERAL BIOCHEMISTRY**

### **Molecular logic and water**

Student will be able to

- describe molecular logic of living organism (in relation to replication, metabolism of biocatalyst, production and exchange of energy).
- draw the structure of water and hydrogen bonds between water molecules and state its importance in properties of water.
- list the importance of hydrogen bonds and dipole interactions and Van der Waal forces in biomolecules.
- define the first and second law of thermodynamics, Gibb's free energy, enthalpy, exothermic and endothermic reactions (exergonic and endergonic).

- describe polar and non polar substances, hydrophilic and hydrophobic effects.
- explain ionization of water and define hydronium ionic product of water, neutral, acidic and basic solution.
- define equivalent weight, molecular weight, moles, osmoses, diffusion, Donna effect, pH, buffer, Henderson and Hasselbach equation.

## Cell

- draw the diagram of E. coli;
- draw the diagram of eukaryotic cell and label various structures;
- describe the hierarchy in cell structure from cell organelle to building blocks;
- list the main functions of organelles and membranes (plasma membrane, nucleus and nucleolus, endoplasmic reticulum, golgi apparatus, mitochondria, lysosomes, peroxisomes, cytoskeleton, cytosol);
- draw a simple diagram showing isolation of subcellular components from rat liver by differential and density gradient centrifugation.

## Biological membranes

- list the composition of membrane and their distribution (lipids, proteins and carbohydrates);
- draw the structures of fluid mosaic model of biological membrane and show their asymmetry;
- describe following modes of movements of molecules through membranes: (a) diffusion, (b) mediated transports, (c) energetic transport systems.
- define ionophore.
- describe the channel ionophores and major cations transportation.
- list the diseases due to abnormality of membrane fluidity and loss of membrane transport (spur cell anaemia, loss of glucose transport from intestine, fructose malabsorption, Hartnup disease).

## Proteins

- describe the functions of proteins in human body.
- describe the proteins as polymers of amino acids.
- draw the structure of peptide bond.
- list the name and draw the side chain of common amino acids.
- classify the amino acids into neutral, acidic, basic and hydrophobic and essential and non-essential.
- define isometric pH, and describe acid base properties of amino acids.
- describe the common reactions of amino acids.
- list the names and principle used in fractionation of proteins.
- describe the primary, secondary, tertiary and quaternary structure of proteins (with reference to Hb., collagen and silk).

## Carbohydrates

- define carbohydrate.
- classify carbohydrates and give example in each group;
- describe isomerism in carbohydrate and form stereoisomerism and optical.
- define and draw pyranose and furanose ring structures, state alpha and beta monomers, glycosides, deoxysugars.
- draw the structure of glucose, fructose, galactose, deoxy- sugars and aminosugars

- describe the importance of oligosaccharides homo and heteropolysaccharides;
- describe important reactions given by carbohydrates;
- list the carbohydrates of membranes;
- list the physiologically important glycoproteins and glycosaminoglycans (mucopolysaccharides) and describe their physiological significances.

### **Lipids**

- define lipid.
- classify lipids into different groups (both saponifiable and non-saponifiable).
- describe the structure, systematic, classification and common names of important saturated and unsaturated fatty acids.
- list the essential fatty acids.
- describe important reactions of fatty acids.
- describe and draw the structure of micelles, liposomes and list the different groups of lipoproteins (classifications).

### **Enzymes**

- define enzyme.
- classify enzymes into six groups (international nomenclature).
- describe the chemical kinetics of enzyme (velocity, order of reaction unit, specific activity, turnover, Michael-Menten equation and its significance).
- describe co-enzymes, their structure, function and co-factors (metal).
- describe different kinds of inhibition of enzymes (competitive, non-competitive and uncompetitive) and give examples of drugs as enzyme inhibitors.
- describe the effect of temperature, pH, reactant con. and enzyme con., in the enzyme catalysis.
- describe the allosteric control of enzyme activity.
- describe the amplification of regulatory signals (phosphorylation cascade and blood coagulation).
- list the major important enzyme of cytoplasm, mitochondria, lysosomes, endoplasmic reticulum, golgi apparatus, peroxisome and nucleus.
- define the functional and nonfunctional enzymes of plasma and list the clinically important enzymes of plasma and their normal level.
- define iso-enzymes and list the clinically important iso-enzymes; describe their role and normal level (LDH, Alkaline phosphatase, CPK Amylase and acid phosphatase).
- list the enzymes having therapeutic roles.
- list the method of estimation of enzyme and iso-enzyme.

### **Metabolism of glucose and other absorbed sugars**

- describe the importance of glycolytic pathways.
- list the fate of glucose in various tissues.
- explain the primary spiting oxido-reduction, phosphorylation, stages.
- describe the stoichometry of glycolytic pathway.
- sketch the shuttle pathways.



- enumerate the inhibitors of the pathways.
- explain the energetics of NADH oxidation.
- describe alcohol oxidation and the effect of barbiturates in combination with alcohol.
- show the relation between pyruvate kinase and haemolytic anaemia.
- show the relation between hypoglycaemia and alcohol intoxication.
- describe diabetes mellitus and hypoglycaemia.
- list the biochemical investigation in Diabetes mellitus and hypoglycaemia.

### **Gluconeogenesis**

- describe the importance of formation of glucose in the body.
- sketch the pathways showing glucose synthesis (including cori cycle and alanine cycle), from amino acids, fats and other sugars.
- explain the regulation of gluconeogenic pathways.
- explain the importance of gluconeogenesis in premature infants.
- explain the hormonal interaction and glucose level; diabetes mellitus and glycosylated Hb.

### **Glycogenolysis,**

- describe the significance of glycogenolysis and glycogenesis.
- sketch the pathways of glycogen degradation and glycogen synthesis.
- describe the special features of glycogen degradation and synthesis and their regulation.
- explain the various glycogen storage diseases and enumerate the mechanism and enzymes involved.

### **Pentose phosphate pathways and monosaccharides interconversion**

- draw the reaction sequences of pentose phosphate pathways.
- explain the significance of pentose phosphate pathway.
- explain the genetic deficiency of glucose-6-phosphate dehydrogenase and its effect! in erythrocytes.
- draw the reactions showing interconversion and relation between glucose, fructose! mannose and galactose.
- explain the fructosuria and fructose intolerance and deficiency of enzyme in these cases.
- explain galactosuria and pentosuria and mechanism involved in these cases.
- describe the glucuronic acid metabolism and physiological significance of glucuronic acid formation.

### **TCA-Cycle**

- describe the energy producing and utilizing system (ATP cycle) and thermodynamic relationship of energy rich compounds.
- explain the mechanism of action and location of PDH and its components.
- list the sources and fate of acetyl co A.
- list the sources and fate of pyruvate.
- draw figures showing individual reactions of TCA cycle and energy yield.
- explain the regulation of TCA cycle.
- explain the correlation between lactic acidosis of children and PDH deficiency and its principle of management.
- describe the anabolic roles of TCA-cycle (porphyrin synthesis, fatty acid synthesis, gluconeogenesis).

- describe anaplerotic reaction.

### **Purine and pyrimidine nucleotide metabolism**

- state the general functions of nucleotides: (a) roles in energy metabolism (b) as units of nucleic acids (c) second messenger (d) components of co-enzymes (e) activated intermediates (f) and as metabolic regulator.
- describe the chemistry and metabolism of purine and pyrimidine nucleotides.
- describe the salvage pathways for purine and pyrimidine nucleotides.
- explain the nucleotide metabolising enzymes as function of the cell cycle and rate of cell division.
- explain the mechanism of action of glutamate antagonists, anti-folate, and other structural analog of purine and pyrimidine (6 mercaptopurine adenoarabinoside, cytosine arabinoside, 5- fluorouracil, deazauridine and hydroxy urea).
- explain orotic aciduria, gout, Lesch Nyhan syndrome as abnormal nucleotide metabolism.

### **Vitamins**

- define vitamin.
- list the fat soluble vitamins.
- list the energy releasing water soluble vitamins and haematopoietic water soluble vitamins.
- list the active forms of vitamin A,D,K, and E; sources and daily recommended allowances.
- describe their (A,D,K,E) physiological roles.
- explain their (A,D,K and E) deficiency diseases and hypervitaminosis);
- list the water soluble vitamins; describe sources, daily allowances and physiological roles, explain deficiency diseases (B1, B2, B6 B12, niacin, folic acid, biotin and vitamin C).

### **Micronutrients**

- list the fat soluble vitamins, their sources, daily allowance, physiological functions and deficiency diseases as well as hypervitaminosis conditions.
- list the haemopoietic water soluble vitamins, their sources and' daily allowance, physiological functions and deficiency diseases.
- list the energy releasing water soluble vitamins, their sources and daily allowance, physiological functions and deficiency diseases.
- list the essential trace elements (Iron, Iodine, zinc, copper, chromium, selenium, manganese, molybdenum, fluoride, Boron etc.), their sources, daily allowance, and their physiological functions, deficiency diseases, as well as excess overdose conditions.

### **Nucleic acids and protein biosynthesis**

- describe the structure of DNA.
- explain DNA duplication.
- enumerate the mutations in DNA and describe DNA repair mechanism.
- describe the characteristic features in the process of transcription.
- enumerate the molecular characteristic features of RNA polymerase.
- describe the properties of mRNA, rRNA and tRNA.
- enumerate the antibiotics inhibiting synthesis of RNA.
- define and enumerate genetic code.

- list the macromolecules required for protein biosynthesis and describe their functions.
- describe the sequential assembly of polypeptide chains (direction, initiation, elongation and release).
- explain the functions of polysomes and release of polypeptide from N-terminal end.
- enumerate the antibiotics inhibiting protein biosynthesis.

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### **Regulation of gene expression**

- explain the operon model regulation in prokaryotes.
- explain the roles of histones, non-histones, gene amplification, retardation and cytoplasmic DNA.
- explain the function of reverse transcriptase.
- describe post transcriptional regulation and function of hormones in gene expression.

### **Inborn errors of metabolism**

- describe the general principles and patterns of inheritance.
- list the biochemical and molecular basis of single gene disorders.
- list the disorders associated with defects in;
  - Structural protein
  - Receptor proteins
  - Enzymes
  - Proteins that regulate cell growth
- list the defects in multifactorial inheritance
- list the defects in single gene disorder in non- classical inheritance.
- identify the importance of diagnostic methods to rule out different inborn errors of metabolisms; list the methods used in molecular diagnosis of genetic disorders.

## **GENERAL PATHOLOGY**

Students will be able to

- describe the concept of cell injury; list the causes and various changes produced by such injury.
- explain different types of tissue degeneration.
- explain necrosis and apoptosis.
- describe intracellular accumulation of lipids, proteins and pigments.
- explain the pathological calcification.
- define inflammation and enumerate the important causes of inflammation; explain the mechanism of inflammation; list the results of acute and chronic inflammation.
- explain the mechanism of wound healing.
- differentiate between healing by first intention and healing by second intention.
- describe cellular adaptation of growth and differentiation.
- describe thrombosis, its cause and mechanism.
- describe embolism and different types of emboli and effects of embolism.
- define ischemia and its types.
- explain infarction and its types.
- state the causes and types of shock; discuss the pathogenesis of different types of shock.
- define edema and enumerate its types.
- define neoplasia and its nomenclature.

- state the predisposing factors of neoplasia.
- describe carcinogens and genes related with cancer.
- differentiate between benign and malignant neoplastic lesions.
- describe metastasis and its mechanism.
- describe the genetic disorders.
- explain the general features of T-lymphocytes, B-lymphocytes, macrophages and natural killer cells.
- define cytokines.
- describe hypersensitivity reactions and its types.
- explain autoimmunity and its causes.
- describe immunodeficiency diseases.
- mention the etiology and pathogenesis of AIDS.
- define autopsy pathology, surgical pathology, special stains, immunohistochemistry, electron microscopy, karyotyping, polymerase chain reaction, and in situ hybridization.
- define exfoliative cytopathology and fine needle aspiration cytopathology.

## **GENERAL MICROBIOLOGY**

### **Introduction to Microbiology**

Students will be able to

- describe the history of Microbial diseases and Koch's postulates
- classify microbes : Prokaryote, Eukaryote and Virus
- describe microbial flora, Nosocomial infection,
- describe the transmission of microorganisms,
- describe the mechanism of pathogenesis
- describe the process and importance of sterilization
- describe the process of disinfection and decontamination

### **Introduction to Bacteriology**

Students will be able to

- describe microscopy
- describe the staining techniques and their principles
- describe bacterial morphology; bacterial spore
- describe bacterial growth and their influencing factors; growth media
  - describe bacterial toxins, bacteriocin
  - describe antimicrobial Sensitivity Testing
  - describe anaerobiosis and anaerobic culture

### **Introduction to Virology**

Students will be able to

- describe morphology and general properties of viruses including replication and pathogenesis

- describe Viral classification and Bacteriophage
- describe laboratory diagnosis of viral diseases, cytopathogenic effect, inclusion bodies, methods of animal inoculation and egg inoculation

### **Introduction to Parasitology (Medically important parasites)**

Students will be able to

- classify parasites
- list medically important parasites
- describe the laboratory diagnosis of parasitic infection

### **Introduction to Mycology**

Students will be able to

- classify medically important fungi
- describe superficial mycoses
- describe subcutaneous mycoses
- describe systemic mycosis
- describe methods of lab diagnosis : Fungal culture, KOH wet mount and Fungal stain

### **Introduction to Immunity and non specific immune system**

Student will be able to

- describe antigen and immunogenicity
- classify immunoglobulins and describe their role in immunity
- describe immune response : Humoral and Cellular
- describe the immunological techniques : method of bringing antigen-antibody reaction in vitro (serological diagnostic tests)

### **Introduction to Microbial genetics**

Students will be able to

- describe genetic materials
- describe mutation and repair mechanism
- describe gene transfer
- describe the genetic basis of pathogenicity
- describe molecular diagnostic technique

## **GENERAL PHARMACOLOGY**

Students will be able to

- explain the definitions and terminology, mention different sources of drugs and describe the advantages and disadvantages of different routes of administration.
- define pharmacokinetics and discuss the influence of disease on pharmacokinetics, usefulness and limitation of therapeutic drug monitoring.
- describe different mechanisms by which drugs act and state the factors

that modify drug effect.

- describe different adverse drug reactions with an example: hypersensitivity, allergy, idiosyncrasy, drug interactions, iatrogenic diseases, overdose, toxicity, pharmacogenetic based drug reactions.
- define addiction; name addictive drugs and list the factors involved in the genesis of "drug dependence", recognize withdrawal syndrome; write correct treatment for drug abuse and withdrawal syndrome when such problems are presented.
- describe genetic disorders and their role in modifications of the actions of drugs, especially with primaquine, corticosteroids, diphenylhydantoin, succinylcholine, nitrates, barbiturates, oestrogens, furazolidine.
- outline the concept of essential drugs.
- describe the steps of rational drug therapy and selection criteria of P drug.
- get sensitized with the promotional activities of drug companies.

## Chemotherapy

Students will be able to

- define the general principles of antibiotic therapy.
- list commonly used -sulfonamides; discuss their present status in therapy.
- list the adverse reactions of sulfonamides.
- point out the advantages of combining sulfonamides with trimethoprim.
- describe antibiotic mainly effective against gram positive bacteria under following headings:
  - name, mechanism of action and special features,
  - therapeutic indications,
  - adverse reactions and their management.
- describe antibiotics mainly effective against gram negative bacteria under following headings:
  - name, mechanism of action and special features,
  - therapeutic indications
  - adverse reactions and their management
  - antibiotics effective against pseudomonas.
- describe broad spectrum antibiotics under following headings:
  - name, mechanism of action and special features.
  - therapeutic indications,
  - adverse reactions and their management
  - describe why broad spectrum antibiotics are called so?
- list the drugs effective against anaerobes; mechanism of action and special features; therapeutic indications; adverse effects and their management.
- describe the misuse of antibiotics.
- describe chemotherapy of viral infections, including HiV/AIDS; describe the difficulties encountered in development of these drugs.
- describe chemotherapy of malaria giving emphasis on:
  - the treatment of choice for acute attack of each plasmodium.
  - the treatment of chloroquine-resistant cases of falciparum malaria,

- the treatment of complications of falciparum malaria,
  - chemoprophylaxis of malaria.
- describe the drugs used for filariasis.
- describe the drugs used in the treatment of Kala-azar,
- list the drugs used in treatment of neoplastic diseases; mention general principles and adverse effects.

**11.1 B. MUSCULOSKELETAL SYSTEM****COURSE OBJECTIVES**

Students will be able to

- identify and explain the nature of abnormalities seen in common musculo-skeletal system diseases in relation to the normal structure and functions;
- outline the principles of therapeutic and behavioural management of patient and families.
- correlate the normal structure and function of musculo-skeletal system to the signs, symptoms, pathophysiological states, diagnosis and management of the following conditions: T.B. spine, leprosy, pain knee joint, eczema, flail chest, painful subcutaneous swelling, pain in neck, frozen shoulder, Poliomyelitis, myalgia, tetanus, SLE, Rheumatoid arthritis, myasthenis gravis, osteomyelitis, supra condylar fracture

**ANATOMY**

Students will be able to

- classify bone according to its size, shape, location and development.
- list the characteristics of each of the types;
- define the terms: tuberosity/ tubercle, trochanter, condyle, trochlea, spine/ crest, sulcus/ groove/ fossa/ fovea/ notch
- describe:
  - the microscopic anatomy of decalcified bone
  - types and composition of cartilage
  - the functions of cartilage
- describe the development of long bones and process of ossification;
- list the factors involved in growth and ossification; explain the primary and secondary ossification centers; explain the law of ossification.
- classify epiphysis;
- classify muscles according to structure, shape and function;
- describe the light microscopic and ultrastructural features of muscle;
- explain the structural alternations during contraction;
- describe the innervation and blood supply of muscle;
- identify epiphyseal cartilage in bones where ossification is not yet complete;
- describe the structure of a joint;
- classify joints according to structure and movement, give examples of each;
- describe the structure and mechanisms of movement of sternoclavicular joint; describe their applied anatomy;
- identify the muscles attached to the scapula, humerus and clavicle;
- relate these muscles to the shoulder joint; movements and the nerves supplying
- them;



- identify the muscular attachments; mark the radioulnar joints; identify the structures in immediate relation to the bones; list the arteries supplying the bones; identify the muscles; related structures, nerves supplying the muscles, capsular attachments, ligaments, reflection of synovial membrane and structures related to the joint in a given specimen of the arm;
- describe the mechanics of movements and the relations of the wrist joint, carpal, carpometacarpal joints;
- identify the attachments of muscles to carpal, metacarpals and phalanges; describe the action of the muscles on the metacarpophalangeal and interphalangeal joints;
- describe the sequelae to interruption of innervation of the hand;
- describe the fascial spaces in the palm and the surgical approaches to drain pus in
- infections of the hand;
- describe the mechanics and movements of hip joint;
- describe the surgical approaches to the interior of the hip joint and drainage of fluid; from the joint:
- describe diseases in terms of structures that constitute the joint;
  - identify the parts of the hip bones and femur in dissected specimens, the
  - structures in immediate relations to them; the structures passing into and from the pelvis, in front and behind the musculature and ligamentous attachments
  - mark capsular attachments of joints in which the bones take part;
  - identify the muscles of the gluteal region, the front of the thigh and their
  - attachments, structures related to them and nerves supplying the muscles;
  - identify the articular surfaces, capsular attachments, the structures related to the joint, the nerves, and blood vessels supplying the joint;
  - describe the mechanics and movements at the knee joint;
  - describe the surgical approaches to the interior and drainage of fluid;
  - describe diseases in terms of structures that constitute the joint;
  - identify the parts of tibia and fibula;
- identify structures in immediate relation to the bones in dissected specimens;
- identify the muscular, ligamentous attachments; capsular attachments of knee joint: in which the bones take part; identify the muscles, the structures related to it, the nerves supplying it and the attachments to the bones; correlate with different injuries related to menisci and cruciate ligaments,
- identify the articular surfaces, the capsular attachments, the structures related to the joint, the nerves and vessels supplying the joint, the structures in the interior of the joint;
  - describe the mechanics and movements of the ankle and tibiofibular joint;
  - describe surgical approaches to the interior of ankle joint;
  - describe disease in terms of structures that constitute the joint;
  - identify the tarsal, metatarsal and phalanges, their articulations with other bones, their locations and directions;
  - identify the attachments of ligaments and muscles to the bones in given specimens;
  - identify the muscles' their attachments, nerves and the arteries supplying them, and the structures related to them;

- identify the articular surfaces, the capsular and ligamentous attachments, the structures related to the joint especially the ankle joint, the nerves and vessels supplying the joints;
- describe the architecture of foot and conditions affecting the floor such as flat foot and talipes with reference to anatomical structures involved;
- identify:
  - the muscles of the foot, their attachments and the structures associated with them;
  - the long tendons coming from the leg in the sole and the dorsum; the ligaments, their attachments;
  - identify the arches of the foot and the structures that maintain the arches;
- describe the muscles of facial expression their innervations and the sequelae to interruption of nerve supply;
- identify;
  - the bones in the anterior, superior, lateral and posterior aspects of the skull and in the walls of the orbit;
  - the foramina and the articulations of the bones of the skull;
  - the muscular, capsular and ligamentous attachments to the bones;
  - nerves and vessels in immediate relation to the mandible;
- identify cranial fossae and the fissures that originate from them;
- identify;
  - the muscles of facial expression;
  - the structures related to them especially in the region of the angle of the eye;
  - the structures in the region of the cheek;
  - the nerves supplying the muscles;
  - the origin of these nerves from the trunk of the facial nerve in the given specimen;
  - describe the structure mechanics and movements of the temporomandibular joint;
  - muscles of mastication;
  - sequelae to interruption of their nerve supply;
  - applied anatomy of dislocation of the joint;
  - describe the nerve supply and action of individual and group of muscles of the eyeball;
  - relate applied anatomy to abnormality in movement of the eyeball;
  - identify the muscles of the eyeball in given specimen;
- describe the structure, mechanics and movements of the occipital and atlantoxial joints;
- describe different parts of the vertebral column;
- identify the parts of cervical, thoracic, lumbar and sacral vertebrae;
- describe the gross arrangement of the musculature of the back in relation to the vertebral column as a whole;
- describe the arrangement of intervertebral joints, with mechanism of movement, nerve and vascular supply; explain in brief the development of vertebral column.
- describe the mechanics of and movements at the joints of the pelvic girdle;
- describe the applied anatomy of the structure and relations of the sacroiliac joint;

- identify bones of pelvic girdle, their articulation, muscles and the ligaments attached to them, the viscera and nerves and vessels related to them.
- identify;
  - the muscles of the abdominal wall;
  - the rectus sheath and its contents;
  - the boundaries and contents of the inguinal canal;
  - the muscles of the pelvic floor and perineum, and
  - posterior abdominal wall.
- describe the mechanism of action of muscles of the abdominal wall;
- describe their role in control of intra-abdominal pressure;
- describe the applied anatomy involved in abdominal hernia;

## **CLINICAL PHYSIOLOGY**

### **Function & Structure of Muscle**

Students will be able to

- classify and describe general functions of muscle.
- describe the organization of muscle into fibers and fibrils.
- draw a diagram showing the sarcomere in detail; compare and contrast the organization and properties of skeletal muscle, smooth muscle, and cardiac muscle.

### **Neuromuscular Transmission:**

Students will be able to

- describe the structure of a neuromuscular junction.
- enumerate the properties and describe the sequence of events occurring at the M junction.
- describe the different neuromuscular blockers: classification, mechanism of action\* clinical importance.

### **Molecular Basis of Muscle Contraction and Relaxation:**

Students should be able to

- describe excitation- contraction coupling in a skeletal muscle.
- describe the sliding filament theory: cross-bridge formation between actin and myosin, role of ATP and Calcium- ions, power stroke.
- differentiate isotonic and isometric contraction.

### **Factors Influencing the Force of Contraction in a skeletal muscle:**

Students will be able to

- describe the types of muscle: slow/oxidative/red and fast/glycolytic/white muscle.
- describe the effect of frequency of stimulation.
- describe motor unit recruitment (quantal summation) and fatigue.

### **Energy Requirements for Muscle Contraction:**

Students will be able to

- differentiate between aerobic and anaerobic contraction.
- show the role of ATP and phosphorylcreatine.

### **Applied Physiology of Skeletal Muscle:**

Students will be able to

- define muscle tone, atrophy and hypertrophy.
- describe the effect of denervation: fibrillation and fasciculation.
- describe the effect of exercise and training.
- describe the clinical application of neuro-muscular blockers, myasthenia gravis.
- describe the principles of EMG and its clinical application.

## **CLINICAL BIOCHEMISTRY**

Students will be able to

- recall the structure of skeletal muscle.
- list the names of contractile proteins.
- explain the molecular basis of muscle contraction.
- list the fuels of skeletal muscle.
- describe the functions of purine nucleotide cycle of skeletal muscle.
- explain effect of training exercise on skeletal muscle metabolism.
- explain:
  - effect of low serum potassium
  - Duchene's muscular dystrophy
  - Luft's syndrome (poor respiratory control)
  - deficiency of carnitine palmityl transferase
- list the distribution of calcium and phosphorus in body and dietary sources.
- describe the absorption and excretion of calcium and phosphorus.
- list biological roles of calcium (neuromuscular, blood coagulation, membrane, enzyme regulation, release of hormone).
- explain the role of Vitamin D in calcium homeostasis.
- list the sites and mode of action of Vitamin D.
- describe the source, site and mode of action of calcitonin.
- explain the control of secretion of calcitonin.
- describe the source and physiological functions and control of parathormone (PTH).
- list the diseases associated with hyper and hypocalcaemia and hypo and hyperphosphataemia.

## **PATHOLOGY**

Students will be able to

- describe healing process of wounds and fractures.
- apply the principle of inflammation to the musculo-skeletal system.
- describe the etiopathogenesis, pathological features and complications of pyogenic and tuberculous osteomyelitis.
- describe the causes and morphological features of osteoporosis.
- describe the etiopathogenesis, pathological features and complications of Paget's disease (osteitis deformans).
- describe the bone disorders due to vitamin D deficiency and hyperparathyroidism.
- list the tumors and tumor-like lesions of bone.
- describe pathological features of osteoma, osteosarcoma, osteochondroma, chondroma, chondrosarcoma, giant cell tumors and Ewing's sarcoma.
- describe the etiopathogenesis and pathological features of osteoarthritis, rheumatoid arthritis and infectious arthritis (tuberculous arthritis).
- explain the etiopathogenesis, pathological features and complications of gout and gouty arthritis.
- classify soft tissue tumors.
- describe the pathological features of rhabdomyosarcoma, leiomyosarcoma, nodular fasciitis, fibrosarcoma, lipoma, liposarcoma, and fibro-histiocytic tumors.
- describe the pathological features of dermatitis, psoriasis, lichen planus, pemphigus and lupus erythematosus.
- describe etiopathogenesis and pathological features of leprosy.
- list the tumors of skin.
- describe the gross and microscopic features of naevus, basal cell carcinoma, squamous cell carcinoma, and malignant melanoma of skin.
- describe different types of muscular dystrophies.

## **CLINICAL MICROBIOLOGY**

Students will be able to

- list and describe the important pathogens affecting the Musculo-skeletal system;
- describe the morphology, pathogenesis, laboratory diagnosis, transmission & prevention of the following organisms:

Bacteria:

- Staphylococcus
- Actinomyces
- Mycobacterium leprae
- Anaerobes with special reference to *C. Perfringens*

Viruses:

- Herpes virus
- Oncogenic virus

Fungi:

- Trichophyton
- Microsporum
- Epidermophyton

Parasite:

- Toxoplasma gondi

## **CLINICAL PHARMACOLOGY**

### **Skeletal muscle relaxants**

Students will be able to

- classify muscle relaxants.
- describe the mechanism of action, therapeutic indications and adverse reactions of these drugs.
- define the therapeutic role of neuromuscular blocking agents as adjuncts to anaesthesia.
- name the drugs and describe their mechanism of action in the treatment of myasthenia gravis.

### **Drugs used in arthritis and soft tissue swellings**

Students will be able to

- list drugs used to treat inflammatory disorder.
- describe their mechanism of action and adverse reactions and contraindications.

### **Drugs used in common skin diseases**

Students will be able to

- describe the present concept of types of histamine receptors.
- discuss the responses of histamine that are antagonized by H1 receptor antagonists.
- list antihistamines based on their sedative properties.
- give the therapeutic indications of H1 antagonists and their adverse reactions.
- list antifungal agents.
- describe their mechanism of action, therapeutic indications and adverse reactions
- list the drugs used in the treatment based on types of leprosy.
- explain the concept of multi drug therapy (MDT) in the treatment of leprosy.
- describe their mechanism of action and adverse reactions.
- describe different local anti-infective agents.
- uses of drugs for scabies, pediculosis, psoriasis, acne and vitiligo.

**11.1C. NEUROSENSORY SYSTEM (INCLUDING SPECIAL SENSES)****COURSE OBJECTIVES**

Students will be able to

- identify and explain the nature of abnormalities seen in common neurosensory system diseases in relation to normal structure and functions.
- correlate the normal structure and functions of neurosensory system to the signs, symptoms patho-physiological states, diagnosis and management of the following common conditions: Headache, Meningitis, Encephalitis, Paralysis, Convulsion, Involuntary movements, Psychosis, Insomnia, Organophosphorus poisoning, Ear discharge (otitis media), Cataract, Conjunctivitis & Squint.

**ANATOMY**

Students will be able to

- define a neuron and classify them on the basis of their structure and function; list the different connective tissue cells of nervous system and their important function.
- divide the N.S. into Central Nervous System (CNS), Peripheral Nervous System (PNS) and Autonomic Nervous System (ANS).
- list the different parts of CNS, PNS AND ANS; explain the different terminologies used in nervous system, e.g., nuclei, tracts and etc.
- mention the different stages of development of nervous system.
- mention the extent, gross anatomy and blood supply of spinal cord; correlate the segments of spinal cord to the vertebral column; describe the formation, course, fate and distribution of a typical spinal nerve.
- describe the formation, distribution and branches of different nerve plexuses- cervical, brachial, lumbar and sacral and correlate the anomalies related to their injuries.
- draw well labeled diagrams of cross sections of spinal cord at different levels.
- mention the extent of brain stem and its different parts, their gross structure and blood supply; locate the attachments of cranial nerves.
- draw well labeled diagrams of medulla, pons and midbrain to locate the nuclei, the ascending and descending tracts and reticular formation.
- mention the location of diencephalon; list different parts of diencephalon.
- explain different nuclei, connections and functions of hypothalamus.
- explain different nuclei, connections and functions of thalamus.
- mention the location, parts, microscopic anatomy, nuclei and their connections of cerebellum; mention the blood supply of cerebellum.
- list the different lobes, surfaces, borders, sulci and gyri of cerebrum and important functional areas; mention the microscopic anatomy of cerebrum.
- explain the white matter, corpus callosum and internal capsule, explain the blood supply of internal capsule and the consequence of ischaemia of internal capsule
- mention the blood supply of brain and correlate the clinical conditions (syndrome related to the loss of blood supply to different parts of brain).
- list the coverings of CNS and foldings of dura mater; explain the formation, composition and absorption of cerebrospinal fluid (CSF).
- list the cranial nerves and mention their functional components.

- list the ascending and descending tracts; explain the fasciculus gracilis and cuneatus, spinothalamic tracts, and spinocerebellar tracts.
- explain the corticospinal tract, cortico bulbar tracts, reticulospinal tract and vestibulospinal tracts.
- explain the normal anatomy of an eyeball.
- explain the course of optic nerve and visual pathway.
- explain the development of eye
- explain the development of branchial arches, and their derivatives.
- explain the development of face, lips and palate; correlate with developmental anomalies such as cleft lip, cleft palate and facial cleft.
- explain the normal anatomy of external ear, middle ear and inner ear.
- describe the course, relation and branches of facial nerve and correlate with the facial nerve palsy.
- explain the development of ear.

## **CLINICAL PHYSIOLOGY**

### **Division and organization of the nervous system:**

Students will be able to

- recall the following divisions of the nervous system: central nervous system, peripheral nervous system, brain/spinal cord, autonomic nervous system, somatic nervous system, ascending tracts, descending tracts, motor function, sensory function, gray matter, white matter, higher functions, reflex activity, and segments division of the spinal cord.

### **Neuron and Synaptic transmission**

Students will be able to

- describe the structure of a neuron, different types of neurons, difference between myelinated and unmyelinated neurons,
- describe the structure of a synapse, synaptic transmission, synaptic inhibition, neurotransmitters.
- describe resting membrane potential and action potential in a neuron, propagation of action potential.

### **Autonomic Nervous System:**

Students will be able to

- distinguish between Sympathetic and Para sympathetic nervous systems with reference to outflow from the central nervous system, organization of pre- and post-ganglionic fibers, neurotransmitters, and overall function.
- draw a diagram of the sympathetic outflow from the central nervous system and the sympathetic ganglia.
- describe the sympathetic plexuses of the body and the distribution of the sympathetic nerves.
- describe the relationship of the sympathetic system to the adrenal medulla.
- describe the effects of sympathetic stimulation on alpha and beta receptors in smooth muscle.
- describe the effects of sympathetic stimulation on cardiac muscle and blood vessels.



- describe the outflow and distribution of parasympathetic nerves.
- describe the action of parasympathetic stimulation on salivary glands.
- show by means of a table how the opposing actions of the sympathetic and parasympathetic systems achieve control of pupillary size, airway resistance, heart rate, digestive tract activity, defecation and micturition.
- describe the effects of the following drugs on the ANS: Catecholamines, alpha and beta blocking agents, ganglion blockers, anti-cholinergics.

### **Motor Systems and Neuromuscular Junction**

Students will be able to

- draw a diagram of the neuromuscular junction and show how acetylcholine acts as a chemical transmitter for striated muscle.
- describe the effect of cholinesterase at the neuromuscular junction,
- describe the effects of anticholinesterases, muscle relaxants, succinyl choline.
- define and describe the motor unit.
- define spastic and flaccid status in muscle.
- define 'twitch', 'clonus' and 'tetanus' in muscle and show how they are determined by the rate of discharge in the motor unit.
- describe the corticospinal tracts (pyramidal tracts) and their role in control of movement, other descending tracts (reticulospinal, vestibulospinal, rubrospinal, tectospinal).
- distinguish between upper motor neurons and lower motor neurons
- trace the passage of a nerve impulse from the motor cortex to skeletal muscle fibre.
- show how the lower motor neuron acts as a 'final common pathway' and its response is a summation of influences from several descending tracts.
- define and classify reflexes, properties of reflexes and their clinical significance.
- describe a reflex arc and the role of 'stretch reflex' in muscle tone.

### **Sensory System**

Students will be able to

- describe sensory receptors: definition, classification, and properties,
- make a list of modalities of sensations transmitted by peripheral nerves and the special senses of the cranial nerves.
- distinguish position sense (proprioception) from external sensation
- describe the muscle spindles and show how they supply proprioceptive information.
- describe the spinothalamic tracts and the sensations carried by them from the periphery to the center.
- describe the dorsal column- medial lemniscus pathway and the sensations carried by this pathway.
- describe the physiology of pain and central analgesia system; explain referred pain.

### **Maintenance of Posture and Reticular formation**

Students will be able to

- describe the vestibular apparatus and how it assists in the maintenance of posture
- describe the part played by muscle spindles and stretch reflexes in the maintenance of posture.
- describe the mechanisms of tendon reflexes and 'reinforcement' technique of tendon reflex and its use.
- describe the connections and functions of the reticular formation including

consciousness and sleep.

## **Brain**

Students will be able to

- recall the anatomy of the cerebrum, cerebellum, thalamus and brainstem (midbrain, pons, medulla).
- draw a diagram of the cerebrum showing the areas associated with motor function (motor homunculus), sensory function (sensory homunculus), speech and language, vision, hearing, smell.
- describe the connections and functions of the thalamus.
- « describe the formation, composition, circulation, and functions of the CSF.
- describe the blood brain barrier and its clinical significance.
- describe the clinical significance of lumbar puncture.
- describe the connections and functions of the prefrontal lobe and the effects of its lesions.
- describe the higher cortical functions: learning and memory, language.
- describe the connections and functions of the hypothalamus.
- describe the connections and functions of the cerebellum.
- describe the basal ganglia and their connections and extra pyramidal control of movement.
- describe the components, connections and functions of the limbic system.

## **Disordered Function of the Nervous System**

Students will be able to

- describe the effects of a complete transverse section of the spinal cord at the mid-thoracic level
- explain the physiological basis of: Brown-Sequard syndrome, syringomyelia, dissociated anesthesia, hemiplegia, paraplegia, quadriplegia, Parkinson's disease, resting tremors, intentional tremors, tetanus, epilepsy, myasthenia gravis, Horner's syndrome, neurological effects of cervical spondylosis, sensory loss in leprosy, motor and sensory aphasia, Romberg's sign.
- describe the effects of upper and lower motor neuron lesions and explain the physiological basis of the effects.

## **Eye**

Students will be able to:

- recall the anatomy of the cornea, lens, ciliary body and retina.
- describe with diagrams the refractive media of the eye and show how light is focused and an image is produced on the retina.
- describe how the shape of the lens is altered to focus objects at near and far distance and how this focusing is controlled.
- define diopter, near point, far point.
- describe pupillary reaction to light and its autonomic control (pathway for light reflex).
- describe the accommodation reflex and its pathway.
- describe the production, circulation, and re-absorption of the aqueous humor.
- describe the vitreous humor.
- describe the organization of the retina and optic nerve and the function of the rods and cones.

- describe the probable mechanism of color vision.
- describe dark adaptation and the function of rods and role of Vitamin A in night vision.
- give the reason for a 'blind spot' in each eye, and show how its effect is neutralized by binocular vision.
- describe with a diagram the optic pathway from the retina to the visual cortex.

### **Disordered Function**

Students will be able to

- state the mechanisms of myopia, hypermetropia, presbyopia, astigmatism.
- explain the phenomenon of Argyll- Robertson pupil.
- appreciate the importance of a unilateral dilating pupil in head injury.
- describe the effects of the following eye drops on the pupil and on focusing: atropine, phenylephrine, sympathomimetics and pilocarpine.
- describe the effects of the following medications on the eye: ingested or injected atropine derivatives, ingested or injected morphine derivatives.
- recognize squint (strabismus).
- describe the patho- physiology of glaucoma.
- describe the common forms of color blindness.
- describe the effects on vision of a lesion on each of the following sites: optic nerve, optic chiasma, optic tract, and optic radiation/ visual cortex.

### **Ear**

Students will be able to

- review the anatomy of the external ear, tympanic membrane and middle ear.
- state the importance of the Eustachian tube and the functions of the middle ear including impedance matching.
- describe the structure of the inner ear, especially relationship of the scala vestibuli, scala tympani, scala media, oval window and round window, location and composition of endolymph and perilymph, basilar membrane, tectorial membrane and hair cells.
- describe how the basilar membrane and nerve cells respond to sound vibrations of varying frequency (different theories), mechanism of hearing.
- describe the nerve pathway from the cochlea to the auditory cortex.

### **Disordered Function**

Students will be able to

- explain the patho- physiology of conduction deafness and nerve deafness and the use of Rinne's and Weber's tests to distinguish these two types of deafness.
- describe the mechanism of otosclerosis, Meniere's disease, transient deafness on change of altitude.
- describe the masking effect of blockage of air conduction upon bone conduction.

### **Taste and Smell**

Students will be able to:

- describe the receptors for taste and smell sensations.
- describe the pathways for taste and smell.
- recognize common disorders of taste and smell.

## **CLINICAL BIOCHEMISTRY**

Students will be able to

- recall the structure of neuron.
- list the nervous tissue lipids and proteins.
- describe the functions of Na-K ATPase.
- describe carbohydrate, amino acid and nucleic acid metabolism in the brain and their special adaptation and metabolic control.
- explain the biochemical reasoning in multiple sclerosis and myelin destruction.
- define synapses, presynaptic membrane, post synaptic membrane, synaptic vesicle, neurotransmitter and neurotransmitter receptor.
- explain the opening and closing of ion channels in plasma membrane and propagation of nerve impulses.
- define depolarisation, hyperpolarization, threshold voltage, and action potential.
- explain the competitive inhibitory action of neurotoxins at Na-channel gate.
- describe the function of acetylcholine and acetylcholinesterase and inhibitory function of snake venom.

## **PATHOLOGY**

### **Neurosensory system**

Students will be able to

- apply the principle of inflammation in nervous system.
- describe the etiopathogenesis, gross and microscopic features of pyogenic, viral, and tuberculous meningitis and tuberculoma.
- differentiate between different types of meningitis.
- describe briefly about different types of encephalitis.
- explain hydrocephalus and its complications.
- describe the etiology, pathogenesis, and morphological features of cerebrovascular disease and its complications.
- state the classification of the tumors of central nervous system.
- describe the pathological features of astrocytoma, oligodendroglioma, ependymoma, medulloblastoma, meningioma, neurofibroma and schwannoma.
- list the causes and types of peripheral neuropathies.
- describe the gross and microscopic features of schwannoma and neurofibroma,
- list common investigations used in the diagnosis of nervous system diseases

### **Eye**

Students will be able to

- describe the etiology, pathological features and complications of conjunctivitis, keratitis, and uveitis.
- classify tumors of eye.
- identify the gross and microscopic features of retinoblastoma and melanoma.

### **Ear, Nose and Throat**

Students will be able to

- describe the etiology, pathological features, and complications of rhinitis, sinusitis, tonsillitis, pharyngitis, and laryngitis.

- describe the gross and microscopic features of nasal polyp.
- list the tumors of the nose, sinuses, nasopharynx and ear.
- describe the pathological features of common tumors of nose, nasopharynx, ear and larynx.
- describe the etiology and morphological features of vocal cord nodule.
- describe the etiology, gross and microscopic features of nasopharyngeal carcinoma and squamous cell carcinoma of larynx.
- describe otitis media and cholesteatoma.
- identify the microscopical features of rhinitis, otitis media, nasal polyp, rhinosporidiosis, nasopharyngeal carcinoma, papilloma, vocal cord polyp and squamous cell carcinoma of larynx.

## **CLINICAL MICROBIOLOGY**

Students will be able to

- list and describe important pathogens affecting Neurosensory system;
- describe the morphology, pathogenesis, laboratory diagnosis, transmission and prevention of the following organisms:
  - Bacteria: Neisseria meningitides
  - Viruses : Polio virus, Rabies virus, Japanese encephalitis virus
  - describe laboratory diagnosis of meningitis

## **CLINICAL PHARMACOLOGY**

### **General considerations of autonomic nervous system**

Students will be able to

- state the meaning of autonomic nervous system.
- describe how this system regulates the different functions in the body.

### **Parasympathomimetics**

Students will be able to

- differentiate the muscarinic and nicotinic effects and describe the salient features of parasympathomimetics with their uses and adverse reactions.
- describe the management of organophosphorus and carbamate poisoning.

### **Sympathomimetics**

Students will be able to

- differentiate various types of adrenergic receptors and describe the importance of these receptors in therapy.
- classify the sympathomimetics clinically and list the basis for their use in therapy.
- list the important adverse reactions and contraindications of sympathomimetic drugs.

### **Antiadrenergic**

Students will be able to

- name the alpha and beta adrenergic receptor blocking agents; list important therapeutic indications, contraindications and adverse effects.

## **Nicotine**

Students will be able to

- describe the pharmacology of nicotine and the hazards of nicotine with special reference to smoking.

## **Drugs used in treatment of pain**

Students will be able to

- name the opiate analgesics; explain their pharmacological actions and mechanism of action.
- specify the main therapeutic uses of these agents.
- compare and contrast the pharmacological actions of morphine to the actions of pethidine, pentazocine, buprenorphine and dextropropoxyphene,
- list the important adverse reactions and contraindications of the opiate analgesics.

## **Drugs used in treatment of fever**

Students will be able to

- list the antipyretic analgesics.
- describe the mechanism of action, therapeutic uses and adverse reactions of these drugs.

## **Alcohol**

Students will be able to

- describe the pharmacological actions of alcohol.
- list pharmacological agents that are used in alcohol detoxification.
- state their indications.
- describe the effect of disulfiram on the metabolism of alcohol, the toxic product which builds up and the symptoms induced by this toxic product.
- describe the long term toxicity associated with chronic alcohol abuse.

## **Drugs used in insomnia**

Students should be able to

- name sedative-hypnotic drugs and state their salient features and describe the major sleep pattern alteration induced by the continued use of most sedative- hypnotic drugs.
- list use and misuse of these drugs.

## **Drugs used in psychosis**

Students will be able to

- define the objectives of treatment of psychosis
- list antipsychotic drugs.
- describe current hypothesis for the mechanism of action of antipsychotics.
- differentiate the phenothiazine derivatives on the basis of use, potency and frequency of adverse effects.
- state the salient features of other antipsychotic agents including atypical antipsychotics.

## **Drugs used in anxiety**

Students will be able to

- define the objectives of treatment of anxiety
- name the antianxiety drugs.
- explain the place of antianxiety agents in the management of anxiety;

- name the adverse effects and contraindications of antianxiety drugs.

### **Drugs used in depression**

Students will be able to

- define the objectives of treatment of depression
- list antidepressants.
- describe the mechanism of action, contraindications and adverse effects of antidepressants.
- list the drugs used in manic-depressive illness.

### **Drugs used in convulsive disorders and Analeptic agents**

Students will be able to

- list antiepileptic drugs
- describe the mechanism of action of antiepileptics.
- list their adverse effects and contraindications.
- name the drugs used in status epilepticus.
- name analeptic agents and give their therapeutic uses and limitations.

### **Local and General anaesthetics**

Students will be able to

- name the local anaesthetic agents.
- give the mechanism of action, important difference, use and adverse reactions.
- state the stages of general anaesthesia.
- list the general anaesthetic agents.
- describe preanaesthetic medication and its importance.

### **Anti Parkinsonian drugs**

Students will be able to

- define the objectives of treatment of parkinsonism
- list the neurohumoral agents suggested to be involved in parkinsonism.
- classify the antiparkinsonian agents and describe the suggested mechanism of action.
- give their important adverse reactions and contraindications.

### **Drugs used to reduce appetite**

Students will be able to

- list the drugs that have been used in the treatment of obesity and their potential misuse.

### **Drugs for eye diseases**

Students will be able to

- name the miotics and list their uses.
- classify the mydriatics.
- differentiate mydriatics of atropine group from adrenaline group,
- give the indications and contraindications of these drugs.
- list the drugs for common eye problems; conjunctivitis, trachoma, glaucoma.

### **Drugs for ENT diseases**

Students will be able to

- state uses of drugs for common ENT problems, e.g vertigo, rhinitis, pharyngitis,

tonsillitis and ear infection.