Savitribai Phule Pune University

School of Health Sciences

PROGRAMME: M.Sc. Health Sciences

Revised as per NEP 2020 implemented from the ACADEMIC YEAR: 2023 – 24 (for affiliated colleges also)

Savitribai Phule Pune University
Department of Health Sciences
Programme: M.Sc. Health Sciences
Cumulative Credits for One Year Post-Graduate Diploma = 44
Cumulative Credits for Two Years Post-Graduate Degree = 88

Semester I		
Course Code	**Course Title**	**Number of Credits**
Semester I: Major Core Courses (SHS501MJ to SHS506MJP)		
SHS501MJ	Fundamentals of Epidemiology (T)	2 T
SHS502 MJ	Human Physiology (T)	4 T
SHS503 MJ	Basic Human Genetics (T)	2 T
SHS504MJP	Health Behaviour (P)	2 P
SHS505MJ	Introduction to Public Health	2 T
SHS506MJP	Applied Epidemiology (P)	2 P
Semester I: Major Core Courses Credits		**14 (10 T + 4 P)**
Semester I: Major Elective Courses (SHS507OE to SHS512OE)		
SHS507OE	Public Health Nutrition (T)	4 T
SHS508OE	Demography (T)	2 T
SHS509OE	The Basics of Yogasanas I (T)	2 T
SHS510OEP	The Basics of Yogasanas II (P)	2 P
SHS511OE	Environment, Health and Safety (T)	2 T
SHS512OE	Occupational Health (T)	2 T
Semester I: Major Elective Courses Credits		**4 T/P**
Research Methodology (SHS513RM)		
SHS541RM	Research Methodology for Health Sciences	**4 P**
Semester I: Cumulative Credits		**22**
Semester II		
Semester II: Major Core Courses (SHS551MJ to SHS554MJP)		
SHS551MJ	Infectious Diseases and Antimicrobial Resistance (T)	4 T
SHS552MJ	International Healthcare Delivery Systems (T)	4 T
SHS553MJ	Basic Immunology (T)	2 T
SHS554MJP	Laboratory Methods for Health Sciences I (P)	4 P
Semester II: Major Core Courses Credits		**14 (10 T + 4 P)**
Semester II: Major Elective Courses (SHS555OE to SHS561OE)		
SHS555OE	Integrative Health (T)	2T
SHS556OE	National Health Programmes (T)	2T
SHS557OEP	Advanced Epidemiology (P)	2P
SHS558OEP	Applied Research Methods (P)	4P
SHS559OE	Monitoring and Evaluation of Programmes(T)	2T
SHS560OEP	Implementation Research (P)	2P
SHS561OE	Disaster Management (T)	2T
Semester II: Major Elective Courses Credits		**4 T/P**
Semester II: Internship /On-Job Training (SHS562OJT)		
SHS581OJT	Internship	**4 (P)**
Semester II: Cumulative Credits		**22**
Total One-Year Cumulative Credits		**44**
Exit option: Award PG Diploma in Health Sciences on completion of 44 credits after Three Years UG Degree OR continue with M.Sc. Health Sciences Second Year		

Semester III		
Course Code	**Course Title**	**Number of Credits**
Semester III: Major Core Courses (SHS601MJ to SHS605MJP)		
SHS601MJ	Epidemiology of non-communicable Diseases (T)	4 T
SHS602MJ	Maternal Health (T)	2 T
SHS603MJ	Applied Immunology (T)	2 T
SHS604MJP	Laboratory Methods in Health Sciences II (P)	4 P
SHS605MJP	Research Proposal Development (P)	2 P
Semester III: Major Core Courses Credits		**14 (8 T + 6 P)**
Semester III: Major Elective Courses (SHS606OE to SHS609OE)		
SHS606OE	Child Health and Nutrition (T)	2 T
SHS607OE	Mental Health (T)	2 T
SHS608OEP	Nutrition Practicum (P)	4 P
SHS609OE	Basics of Pharmacology (T)	2 T
Semester III: Major Elective Courses Credits		**4 T/P**
Research Project (SHS610RP)		
SHS631RP	Research Project in Health Sciences – I (P)	**4 P**
Semester III: Cumulative Credits		**22**
Semester IV		
Semester IV: Major Core Courses (SHS651MJ to SHS654MJ)		
SHS651MJ	Bioethics and Clinical Studies (T)	4 T
SHS652MJ	Environment, Health & Disease (T)	2 T
SHS653MJP	Applied Human Genetics (P)	2 P
SHS654MJP	Data Sciences for Health Research (P)	4 P
Semester IV: Major Core Courses Credits		**12 (6 T + 6 P)**
Semester IV: Major Elective Courses (SHS655OEP to SHS660OE)		
SHS655OEP	Health Research Communication (P)	2P
SHS656OE	Tribal Health (T)	2T
SHS657OE	Human Molecular and Cellular Biology (T)	2 T
SHS658OE	Disability and Health (T)	2T
SHS659OE	Health Economics (T)	2 T
SHS660OE	Healthy Aging (T)	2T
Semester IV: Major Elective Courses Credits		**4 T/P**
Semester IV: Research Project (SHS661RP)		
SHS681RP	Research Project in Health Sciences – II (P)	**6 P**
Semester IV: Cumulative Credits		**22**
Total Second-Year Cumulative Credits		**44**
Two Years- 4 Semesters Award M.Sc. Health Sciences Degree on completion of 88 credits		

SEMESTER-I: MAJOR CORE COURSES

SHS501MJ: Fundamentals of Epidemiology: 2 Credits

Course Objectives

- To familiarise students on science and methods of epidemiology

Course Outline

1. Historical aspects, definition, aim and uses
2. Descriptive epidemiology
3. Risk measurement, Measurement of morbidity and mortality: Incidence, Prevalence,
4. Age-adjustment and survival analysis, use of morbidity and mortality

Suggested reading:

1) Gordis Leon. Epidemiology (Fifth edition), Elsevier Saunders, 2013.
2) Dona Schneider and David E. Lilienfeld. Lilienfeld's Foundations of Epidemiology, Fourth Edition, Oxford University Press, USA, 2015.
3) Porta Miquel. A Dictionary of Epidemiology, Oxford University Press, USA, 2014
4) Somerville Margaret, et al., Public Health and Epidemiology at a Glance, Second Edition, Wiley-Blackwell, 2016
5) Beaglehole. R. Bonita, et. al Basic Epidemiology, 2nd Edition, WHO Publication, Geneva, 2006.

SHS502MJ Human Physiology: 4 credits (T)

Course objectives:

- To provide an understanding of the structure and function of the human body
- To discuss applications of physiology in health promotion and disease prevention

Course outline

1. Human life cycle: conception, growth and development
2. Homeostasis and health
3. Cells and tissues of the human body
4. Structure and function of organs and systems; musculoskeletal, cardiovascular, respiratory, digestive, urinary, reproductive, lymphatic, nervous system and sense organs
5. Lifestyle and human physiology
6. Applied Physiology for health promotion and disease prevention

Suggested reading:

1) Guyton and Hall Textbook of Medical Physiology (Guyton Physiology). International Edition, 2020
2) K Sembulingam. Essentials of Medical Physiology. 2022
3) David L. Nelson and Michael Cox. Lehninger Principles of Biochemistry: International Edition. 2021
4) Chatterjee C. Human Physiology 12th Edition. 2018
5) J. Tortora G J. Tortora's Principles of Anatomy and Physiology Paperback – 26 May 2017

SHS503MJ Basic Human Genetics: 2 credits (T)

Course Objectives:

- To present the fundamentals of human genetics with specific reference to health and disease

Course outline:

1. Genetics in health and disease, introduction to the concept of classical and molecular genetics, history of genetics.
2. Organization of the human genome, chromosome structure, Gene dosage and X-inactivation,
3. Genetic basis of human disease: chromosomal abnormalities, prevalence, presentation, chromosome structure, analysis and classification of abnormalities, human genetic variations
4. Molecular basis of heredity: DNA as the genetic material, structure and replication with special emphasis on how continuity of the genetic information is maintained.
5. Structure of a gene, transcription and translation,
6. Mutations and polymorphism, mutagens, mutagens and teratogens, DNA repair, repair defects and cancers
7. Birth defects and congenital abnormalities

Suggested reading:

1. Molecular Biology of Cell, Alberts et al, Garland; 3 edition 1994
2. Molecular Cell Biology, Lodish et al, W. H. Freeman; 5 edition, 2003
3. Concepts of Genetics, Klug and Cummins, 7th edition, Prentice Hall, 2002
4. Human Molecular Genetics, Strachen and Read, 2nd edition, BIOS Scientific Publishers, 1999
5. Genes VII, Lewin et al, Oxford University Press, USA 1999
6. Medical genetics, Prichard and Kroff, 3rd edition, Mosby; 2005
7. Reviews and papers, Pubmed

SHS504MJP: Health Behaviour (Practical): 2 Credits

Course Objectives:

- To understand concept of health promotion, health-related behaviour change theories
- To impart skills to design health education messages for public health problems.

Course Outline:

1. Scope and Evolution of Health Promotion:Principles of health Promotion, Need assessment for health promotion
2. Health behaviour: Theories, concepts and models used in behavioural and social science applied in Public Health
3. Health communication and Health Literacy: Information-education-communication, social and behaviour change communication
4. Health education: approaches, methods and materials, use of technology in health education, designing of messages and pretesting.

Suggested readings:

1) Marks D, Murray M, Brian Evans, Estacio EV, Health Psychology.Delhi: sage publication, 2011
2) Scott Kahan, Andrea C. Gielen, Peter J. Fagan, Lawrence W. (eds)Green Health Behavior Change in Populations. USA: JHU Press, 09-Oct-2014
3) Karen Glanz, Barbara Rimerand K.Viswanath (eds) Health Behaviour : Theory Research and Practice. Jossey-Bass, July 2015
4) 4.Prestwich,A. Jared Kenworthy , Mark Conner Health Behavior Change: Theories, Methods and Interventions. London and Newyork: Routledge, 6 October 2017, ISBN-13: 978-1138694811
5) Baranowski, T., Perry, C.L., Parcel, G.S. 2002. How Individuals, Environments, and Health Behavior Interact. In: Glanz, K., Rimer, B.K., Lewis, F.M., editors. Health Behavior and Health Education: Theory, Research, and Practice. 3rd Edition. San Francisco, CA: Jossey-Bass. p. 165-184.
6) Gitlin L., Sara Czaja. Behavioral Intervention Research: Designing, Evaluating, and Implementing. New York: Springer Publishing Company, 2015ISBN 13 9780826126580

SHS505MJ: Introduction to Public Health (T): 2 Credits

Course Objectives:

- To introduce students to the discipline of public health
- To understand determinants of health
- To understand the status of health and disease at global and national levels

Course outline:

1) The Science and Practice of public health
2) History of public health
3) Determinants of Health
4) Measures of disease in population
5) Sources of global health data
6) Functional organisation of the public health system in India
7) Evolution of global public health initiatives: primary health care, selective primary health care, MDGs, SDGs

Suggested Reading:

1) Class handouts
2) Oxford textbook of Public Health Ed. Roger Detels, James Mcewen, Robert Beaglehole, and Heizo Tanaka Oxford University Press (OUP) 4thEdition: 2002.
3) Public Health at the Crossroads – Achievements and Prospects. Robert Beaglehole and Ruth Bonita 2nd Edition Cambridge University Press
4) Maxcy-Rosenau-Last Public Health & Preventive Medicine, Fourteenth Edition Ed Robert Wallace, MD, et al.
5) Epidemiology and Management for Health Care: Sathe, et al. Popular Prakashan, Mumbai,
6) International Public Health: Diseases, Programs, Systems, and Policies by Michael Merson, Robert E Black, Anne J Mills - Jones and Bartlett Publishers.
7) Preventive and Social Medicine, K Park, BansaridasBhanot Publishing House.

SHS506MJP: Applied Epidemiology (P): 2 Credits

Course Objectives:

- To understand the determinants and measures of disease and health-related states
- To understand the status of health and disease at global and national levels
- To understand the applications of epidemiology in public health decision making

Course outline:

1) Risk measurement, Age-adjustment and survival analysis,
2) Epidemiological study designs
3) Bias, confounding, interaction, causal association
4) Disease Surveillance
5) Sources of global health data

Suggested Reading:

1) PV Sathe and PP Doke .Epidemiology and Management for Health Care:, Fifth Edition. Popular Prakashan, Mumbai,2018
2) Michael Merson, Robert E Black, Anne J Mills. International Public Health: Diseases, Programs, Systems, and Policies . Jones and Bartlett Publishers. 2006
3) David D Celentano, Moyses Szklo. Gordis Epidemiology (Sixth edition), Elsevier 2019.
4) Dona Schneider and David E. Lilienfeld. Lilienfeld's Foundations of Epidemiology, Fourth Edition, Oxford University Press, USA, 2015.
5) Porta Miquel. A Dictionary of Epidemiology, Oxford University Press, USA, 2014
6) Somerville Margaret, et al., Public Health and Epidemiology at a Glance, Second Edition, Wiley-Blackwell, 2016

SEMESTER-I: MAJOR ELECTIVE COURSES

SHS507OE: Public Health Nutrition (T) : 4 Credits

Course objectives

- To orient students about the basic principles of nutrition in the context of burden of nutritional deficiencies
- To identify public health nutrition issues and interventions
- To study the impact of nutritional policies and programmes

Course outline

1. Introduction to public health nutrition: Introduction to nutrition, inter relationship between food, nutrients & health. Nutritional Status and its assessment. Common terms related to nutrition. Food group classification, Concept of food pyramid. Balance diet.

2. Undernutrition: global and Indian prevalence of undernutrition, risk factors consequences

- Undernutrition in children: Main forms of undernutrition Stunting, Wasting, Underweight, and Micronutrient Deficiencies definition, assessment techniques, Growth chart, National and international growth references.
- Undernutrition in adult: BMI WHO and Asian cut offs.
- Energy: Introduction, Physiological fuel value, Basal Metabolic Rate, Total Energy Expenditure, Components of TDEE (BMR, physical activity, thermic effect of food), Methods of estimating TDEE, Understanding the concept of energy balance (i.e., when energy intake equals energy expenditure). Macronutrients (carbohydrates, proteins, fats) as sources of energy and their caloric values. Consequences of energy imbalance on health, including obesity, undernutrition, and related chronic diseases.
- Protein: Introduction, function, RDA, sources, quality of protein (Protein efficiency Ratio, Biological values, Net protein utilization, The Protein Digestibility Corrected Amino Acid Score, The Digestible Indispensable Amino Acid Score. Essential amino acid, Limiting amino acid and ways to improve quality of protein intake.
- Protein energy malnutrition (PEM) –Kwashiorkor, Marasmus, cause, sign symptoms and role of Energy and protein and difference between Kwashiorkor Marasmus.
- Global Hunger Index (GHI)
- Lifecycle Approach to Undernutrition:
  - Maternal nutrition and its impact on fetal development
  - Infant and young child feeding practices
  - Nutrition during adolescence
  - Nutrition in the elderly
- Interventions for Undernutrition:
  - Food supplementation programs (e.g., school feeding, maternal and child health programs)
  - Micronutrient supplementation and fortification
  - Behavior change communication and education
  - Agricultural and food security interventions

3. Micronutrient deficiency disorders: Introduction to micronutrients (Vitamin A, Vitamin D, Vitamin B_{12}, Folate, Iron, Iodine, Calcium, Zinc), functions, dietary sources, RDA, deficiency- sign and symptoms. Risk Factors, Consequences of each micronutrient deficiency.

4. Over nutrition: Evolutionary principle, screening of those at nutritional risk,

- Carbohydrate: Introduction, types, function, Sources, RDA, deficiency and excess intake Concept of Glycaemic Index.
- Fiber types soluble, insoluble fiber, role in health and diseases
- Fat: Classification of fatty acids, Function, sources, RDA, & deficiency. Saturated fat, MUFA, PUFA, essential fatty acids. Cholesterol – introduction, sources, requirement.

Role of carbohydrate and fat in overweight and obesity.

5. Nutrition Transition: Demographic, economic transition, lifestyle and dietary consumption patterns leading to NCDs, nutrition transition model

6. Food Security and nutrition: issues of food security in the context of urbanization, emergencies, its relation to sustainable development goals, sustainable agriculture development, Food security bill in India

Suggested readings

2) Vir S.C., (2015), Public health nutrition in developing countries (Part I and II), Woodhead Publishing India Pvt, Ltd.
3) Mann, J. and Truswell, S. eds., 2017. Essentials of human nutrition. Oxford University Press.
4) Eastwood, M.A., 2013. Principles of human nutrition. Springer.
5) Bender, D., 2014. An introduction to nutrition and metabolism. CRC Press.
6) WHO and Chan, M., 2011. 'Haemoglobin concentrations for the diagnosis of anemia and assessment of severity', Geneva, Switzerland: World Health Organization, Geneva pp. 1–6.
7) Cashman, K. D., Sheehy, T., & O'Neill, C. M. 2018. Is vitamin D deficiency a public health concern for low middle income countries? A systematic literature review. European journal of nutrition, 1-21.

SHS508OE: Demography: 2 Credits (T)

Course objectives

- To familiarize students to the fundamentals of population studies and its links with health
- To impart practical knowledge and skills of demographic and health data sources and practical use of data

Course outline

1. Introduction to population and health: definition, scope, Concept of demography, Population components, Demographic transition theory
2. Sources of demographic and Health data: Population census, Vital registration system, Sample Registration System, National Family Health Survey (NFHS), District Level Health Survey (DLHS), Annual Health Survey(AHS), National Sample Survey Organization (NSSO) (demonstrate the practical use of the data and its advantages and limitations.)
3. Population composition: Levels and trends in the sex and age structure of the population of world and developed and developing countries
4. Concepts, definition, determinants and measurement of fertility, mortality and migration, population projection
5. Life tables: Concept, importance and methods
6. Population policy: Population policy linkages with health issues

Suggested reading:

1) The Springer Series on Demographic Methods and Population Analysis: Ed.: **Land**, Kenneth C. "The Plenum Series on Demographic Methods and Population Analysis" Durham, NC 27708-0088, USA, 2014
2) Population Studies and Development from Theory to Fieldwork: **Petit**, Véronique (Ed.) Springer International Publication AG 2018
3) Handbook of Population: Ed. Dudley Poston and Michael Micklin. Springer publication, Edition one, 2006
4) Principles of population Studies: Asha Bhende and Tara Kanitkar, Himalaya Pub, Houses, Mumbai, 2011
5) The methods and Materials of Demography (Second edition): Siegel, Jacob S., and David A. Swanson, Elsevier Academic Press, San Diego, 2004

SHS509OE: The Basics of Yogasanas - I (Theory): 2 Credit

Course Objectives:

- To introduce Yoga and discuss effects of Yogasana on various body systems

Course Outline:

1 Concepts of Yoga: Introduction to Yoga, Concept of Pancha Kosha :Yogic Concept of Human Body, Benefits of Yoga
2 Yogasana and anatomy: Importance of Anatomy & Physiology, Concept of Ashtang Yoga, Integrated personality development through Yoga, Yoga and Biological Clock.
3 Preparation for Yogasanas: Preparations for Yoga, body movements required for Asana, loosening Techniques, loosening techniques for all systems, stretching & relaxing
4 Musculoskeletal System: Introduction to Musculoskeletal System, Anatomy & Physiology of the system, Yogasanas as per Musculoskeletal System, preventive and therapeutic benefits of Yogasanas
5 Respiratory & Cardiovascular Systems: Introduction to Respiratory & Cardiovascular Systems, Yogasanas as per Respiratory & Cardiovascular Systems, preventive and therapeutic benefits of Yogasanas
6 Nervous System & Endocrine System: Introduction to Nervous System & Endocrine System, Yogasanas as per Nervous & Endocrine System, preventive and therapeutic benefits of Yogasanas
7 Digestive System: Introduction to Digestive System, Yogasanas as per Digestive System, preventive and therapeutic benefits of Yogasanas
8 Urinary & Reproductive System: Introduction to Urinary & Reproductive System, Yogasanas as per Urinary & Reproductive System, preventive and therapeutic benefits of Yogasanas
9 Mind Body Connection: Mind Body Connection through Yogasana
10 Yoga as way of life: Benefits of Yoga for health and happiness

Suggested Reading:

1) Hansaji Yogendra. Yoga For All: Discovering the true essence of yoga. Rupa Publications, New Delhi-11000. 2019
2) Shirley Telles. A Glimpse of The Human Body. Swami Vivekananda yoga Prakashana, Bangalore-560019. 2018
3) H R Nagendra. Yoga Its Basis and Applications. Swami Vivekananda Yoga Prakashana, Bangalore-560019. ISBN:81873133188. 2016
4) Online Publications by Ministry of Ayush, Govt of India: https://yoga.ayush.gov.in/Publications

SHS510OEP: The Basics of Yogasanas - II (Practical)

Course Objectives: To experience physical and mental effects of Yoga practices

Course Outline:

1. Preparatory practices: warm up and loosing, relaxing organs
2. Yogasana for body systems
    a. Musculoskeletal System
    b. Respiratory & Cardiovascular Systems
    c. Nervous System & Endocrine System
    d. Digestive System
    e. Urinary & Reproductive System
3. Breathing techniques
4. Deep relaxation techniques
5. Yoga based activities and games

Suggested Reading:

1) Hansaji Yogendra. Yoga For All: Discovering the true essence of yoga. Rupa Publications, New Delhi-11000. 2019
2) Shirley Telles. A Glimpse of The Human Body. Swami Vivekananda yoga Prakashana, Bangalore-560019. 2018
3) H R Nagendra. Yoga Its Basis and Applications. Swami Vivekananda Yoga Prakashana, Bangalore-560019. ISBN:81873133188. 2016
4) Online Publications by Ministry of Ayush, Govt of India: https://yoga.ayush.gov.in/Publications

SHS511OE: Environment, Health and safety (T): 2 Credits

Course objective:

- To enable the students to identify the various sources of environmental threats to health and the ways to manage these threats and hazards to prevent related diseases

Course Outline

1. Principles of environment health and human ecology
2. Food sanitation and safety
3. Vector and rodent control
4. Waste disposal
5. Environmental pollution: Environment health policy, Current and emerging issues in the environment, including global warming
6. Climate change: Global warming, ozone depletion, pollution, etc.
7. Climate change and its adverse effects – health

Suggested Readings

1. Class Handouts
2. Relevant research papers and articles published from authentic sources

SHS512OE: Occupational Health (T): 2 Credits

Course objective:

- To enable the students to identify the various occupational hazards to health and the ways to manage these hazards so as to prevent related diseases

Course outline:

1. Occupational health: Hazards at the workplace
2. Diagnostic criteria of various occupational diseases
3. Workplace safety: Prevention of occupational hazards (including accident prevention)
4. Legislations related to occupational health,
5. Employees State Insurance Scheme and other employee benefits schemes
6. State and Central Government policies for the welfare of employees

Suggested Readings

1. Class Handouts
2. Relevant research papers and articles published from authentic sources

SEMESTER-I: RESEARCH METHODOLOGY (RM)

SHS541RM: Research Methodology for Health Sciences: 4 Credits

Course Objectives:

- To introduce students to research methodology in public health sciences.
- To understand the role of biostatistics as a supportive discipline of public health and epidemiology.

Course Outline:

1. Introduction to Research: Research strategies and design
2. Introduction to biostatistics: Descriptive and Inductive statistics
3. Describing data: Variables: Nominal, Ordinal and Interval scale variables. Measures of central tendency: Mean (arithmetic, geometric, harmonic) Median, Mode; Merits and demerits of different measures. Measures of dispersion: Range, Variance, Standard Deviation; Merits and demerits of different measures of dispersion. Measures of Skewness and Kurtosis; Graphical presentation of data
4. Introduction to the concept of probability, events; exhaustive, mutually exclusive events; laws of probability, additive and multiplicative laws of probability and its properties
5. Discrete probability distributions: Binomial probability distribution, Poisson distribution, and their properties. Continuous probability distribution. Introduction to normal distribution and its properties
6. Sampling methods: Type of sampling, Probability sampling, Non-probability sampling, sample size determination
7. Correlation: Concept of correlation, Pearson correlation coefficient, and its properties; Spearman ranks correlation coefficient
8. Concepts in Inductive statistics: Population, sample parameter, and statistic. Sampling distribution of mean and standard error. Statistical hypothesis, critical region, level of significance, and two types of errors.
9. Test of Significance: T-test for small samples and tests based on normal distribution for large samples. Testing the association of attributes and Chi-square goodness of fit
10. Nonparametric tests: One sample test, two sample tests, linear regression, multiple linear regressions, one-way ANOVA and two-way ANOVA
11. Introduction to statistical software
12. Working with data: Computing variables, recoding variables, sorting data, grouping data, ensuring quality of data
13. Exploring data: Descriptive statistics, Frequencies, compare means, frequency tables and crosstabs, multiple response analysis
14. Analysing data: Pearson correlation, The Chi-Square Test of Independence, comparing means: One sample t tests, Paired t tests, Independent samples t tests, and One-way ANOVA, Multivariate analysis: Linear regression, logistic Regression analysis

Suggested reading:

1) Health research methodology: A Guide for Training in Research Methods, Second Edition, World Health Organization, 2001
2) Kothari, C.R. (2019) Research Methodology: Methods and Techniques. 4th Edition, New Age International Publishers, New Delhi.
3) Statistics for Social sciences: T. Rajaretnam, Sage publication. New Delhi 2016
4) Fundamentals of Statistics (Seventh Edition): S.G. Gupta. Himalaya Publication, Mumbai, 2017

5) Introduction to Biostatistics and Research Methods (Fifth Edition): P.S.S. Sundar Rao, J. Richard, Prentice Hall, New Delhi, 2012
6) Scott Menard 2009 Logistic Regression: From Introductory to Advanced Concepts and Applications 1st Edition Sage Publications
7) J. Martin Bland 2003. An Introduction to Medical Statistics (Oxford Medical Publications) Paperback – Illustrated
8) Daniel, Wayne W., Cross, Chad Lee. 2013. Biostatistics: a foundation for analysis in the health sciences. Wiley.

SEMESTER II: MAJOR CORE COURSES

SHS551MJ: Infectious Diseases and antimicrobial resistance: 4 Credits (T)

Course objectives:

- To understand the biology of pathogens and the mechanism of action of antibiotics and antivirals
- To understand the pathology, pathogenesis, clinical manifestation, mode of transmission, prevention and control of diseases of bacterial and viral etiology

Course outline

1. General overview of infectious diseases and their impact in developing countries
2. Epidemiology of infectious diseases
3. Structure of prokaryotic cell, pathogenic modifications
4. Antimicrobial agents, drug resistance
5. Antimicrobial Resistance (AMR) and AMR Stewardship Approaches and Illustrative Examples
6. AMR Stewardship Interventions in hospital settings in India and Globally
7. Infectious diseases, including agent biology, epidemiology, pathogenesis and pathology, clinical presentation and management
    a. Vaccine-preventable diseases: TB, polio, diphtheria, tetanus, measles.
    b. Respiratory diseases: Tuberculosis, leprosy, ARI's
    c. Intestinal: Diarrhoea, typhoid, worm infestations
    d. Contact: STIs and AIDS
    e. Vector borne: malaria and filaria, JE, dengue,leptospirosis,
    f. zoonotic: plague and rabies
8. Neglected tropical diseases

Suggested readings:

1) Duguid et al. Textbook of Medical Microbiology
2) Javetz and Melnick:Adelbergs Medical Microbiology
3) World Health Organization: Report on infectious diseases, and Report on Multidrug resistance, World Health Organization, Geneva
4) Principles and Practice of Medicine: Davidson, Edward, Bouchier et. Al., Pearson Professional Ltd. London
5) Biology of Disease: Jonathan Phillips, Paul Murray, Blackwell Science Ltd. Australia,
6) Human Virology: A textbook of Students of Medicine and Microbiology, Dentistry, Leslie collier, John Oxford, Oxford University Press, Tokyo
7) Textbook of Medicine: Cecil, Bennett, et al., Harcourt Brace Joanvich Inc. U.S.A.
8) Nelson K E : Infectious disease epidemiology : theory and practice
9) GrieseckeJ : Modern infectious disease epidemiology
10) National Disease Control Programmes websites and class handouts
11) Expert Committee Report on Public Health Systems in India 1996

SHS552MJ: International Health Care Delivery systems: 4 credits (T)

Course objectives:

- To familiarize students with international health care systems
- To appraise pros and cons of various health care delivery systems

Course outline:

1) International Health Care Systems: Introduction
2) Health care in the USA: Private insurance, Federal Insurance, Publicly funded insurance (Medicare, Medicaid), Obamacare
3) UK healthcare system: National Health System, public, private profit and nonprofit hospitals
4) Healthcare in the European Union: discussion on three models at work within the EU: single-payer, socialized, and privatized-regulated.
5) Healthcare systems in Asia: Singapore, China, India
6) Healthcare systems in Australia: Australia has a tax-funded universal free public health insurance program called Medicare. All citizens get free care for the public and many physician services and drugs at public hospitals.
7) Healthcare systems in South America: Columbia, Costa Rica
8) Health Care systems in Africa: Ghana, Kenya

Suggested Readings:

1) Tikkanen, R. et al. (2021). U.S. Health Care from a Global Perspective, 2019: Higher Spending, Worse Outcomes? https://www.commonwealthfund.org/publications/issue-briefs/2020/jan/us-health-care-global-perspective-2019
2) Healthmanagement.org. (2006). Facts & Figures: The UK Healthcare System. https://healthmanagement.org/c/it/issuearticle/facts-figures-the-uk-healthcare-system
3) Great Britain: The National Health Service. https://sites.psu.edu/smithcivicblog/2016/01/16/great-britain-the-national-health-service/
4) Ec.europa.eu (2017). European semester thematic factsheet: Health systems.
5) Thorlby, R. (2021). International Health Care System Profiles England. https://www.commonwealthfund.org/international-health-policy-center/countries/england
6) Earn, L. C. (2021). International Health Care System Profiles Singapore. https://www.commonwealthfund.org/international-health-policy-center/countries/singapore
7) Gupta, I. (2021). International Health Care System Profiles India. https://www.commonwealthfund.org/international-health-policy-center/countries/singapore
8) World Health Organization. Regional Office for Europe, European Observatory on Health Systems and Policies, Miguel Á González Block, Hortensia Reyes Morales, Lucero Cahuana Hurtado. et al. (2020). Mexico: health system review. World Health Organization. Regional Office for Europe. https://apps.who.int/iris/handle/10665/334334
9) Kim, S. Universal Healthcare Systems and Fragmentation in Latin America. https://sites.google.com/macalester.edu/phla/key-concepts/universal-healthcare-systems-and-fragmentation-in-latin-america
10) Fang, H. (2021). China. https://www.commonwealthfund.org/international-health-policy-center/countries/china

SHS553MJ: Basic Immunology for Health Sciences: 2 Credits (T)

Course objectives

- To provide a basic knowledge of the human immune system
- To introduce students to the determinants of the human immune response
- To introduce the role of immune system in human health and disease

Course outline

1. Introduction, basic concepts in immunology
2. Components of the immune system: Cells and organs in the immune system
3. Determinants of the immune response
4. Innate immunity: Different lines and layers of defence, The complement system
5. Adaptive immunity- humoral and cell mediated
6. Antibody structure and function: The structure of a typical antibody molecule, Interaction between the antibody and specific antigen; Antigen processing and presentation
7. Cytokines and immunomodulation
8. Hypersensitivity and allergy
9. Autoimmunity: mechanisms, systemic and organ-specific autoimmune disorders in humans

Suggested reading:

1) Essential Immunology: - Ivan Roitt, Blackwell scientific publications, London Edinburgh Boston, Australia,.
2) Immunology : Janis Kuby, W.H. Freeman and company, U.S.A.
3) Immunobiology : The immune system in health and disease: J. Travers, current biology pub, New York,.
4) Vaccines Prospects and perspectives: Harmindar Sing, Rajesh Bhatia, Forward pub. Co., Delhi,
5) Relevant documents and Suggested texts therein from the WHO website
6) WHO Technical Publications: Vaccines, Human Genetics Program series.
7) Harrison's Principles of Internal Medicine Current edition

SHS554MJP:Laboratory Methods in Health Sciences I: 4 credits Practical

Course objective

- To demonstrate the diagnostic methods that are used for supporting disease control and environmental health activities and the underlying principles

Course outline:

1. Introduction to Lab
2. Microbiology –Basic aseptic techniques and media preparation, spread plate, streak plate Gram staining, microbial growth curve, culture, antibiotic susceptibility testing.
3. Haematological methods: Blood grouping, TBC, WBC, RBC count
4. Biochemistry: glucose estimation, liver function tests; Estimation of haemoglobin
5. Immunology: Ouchterlony Double Diffusion, ELISA
6. Molecular biology: Protein estimation by Biuret, Bradford and Folins Lowry method

Suggested reading:

1.Textbook of Medical Laboratory Technology, P.B. Godkar, Balani publishing, House Bombay.
2.Basic laboratory Methods in Medical Bacteriology, WHO, Geneva.
3.Basic laboratory Methods in Medical Parasitology, WHO, Geneva

SEMESTER II: MAJOR ELECTIVE COURSES

SHS555OE: Integrative Health: Credits 4 (T)

Course Objective:

- To introduce students to advancing research in integrative health approaches

Course Outline:

1. Integrative approaches for health research: Overview of Traditional, Complementary and Alternative Medicine (TCAM) systems, Ayush systems
2. Global research trends: Yoga, lifestyle and behaviour, mind-body medicine, natural product research, research methods for integrative health
3. Institutional initiatives: Institutional initiatives for training and research on Integrative Medicine, TCAM and Ayush systems
4. Case studies: Publications on integrative health research projects, Science initiatives in Ayurveda, Ayurveda Biology, Ministry of Ayush initiatives, modern approaches for traditional knowledge-based research
5. Research publications: Overview of research publications on TCAM and Ayush systems, activities (journal club presentations / short reviews etc)

Suggested reading:

1. Patwardhan B, Mutalik G, Tillu G. 1st ed. Amsterdam: Academic Press, Elsevier Inc; 2015. Integrative Approaches for Health. Biomedical Research, Ayurveda and Yoga.
2. Patwardhan B, Mutalik G. Search of novel model for integrative medicine. Chin J Integr Med. 2014 Mar;20(3):170-8.
3. https://www.who.int/health-topics/traditional-complementary-and-integrative-medicine#tab=tab_1
4. Relevant research papers from PubMed/Scopus/Web of Science

SHS556OE: National Health Programmes: 2 Credits (T)

Course objectives:

- To understand the principles of infectious disease control programmes
- To orient students about the national disease control programmes,
- Critical evaluation of various disease control programmes

Course outline

1. Infectious disease control programmes (including agent biology, epidemiology, pathogenesis and pathology, clinical presentation and management, public health strategies and mechanisms)
2. Universal Immunization Programme in India: TB, Polio, Diphtheria, Tetanus, Measles.
3. Elimination Programmes: Tuberculosis, Leprosy, Malaria
4. Emerging and Newly Emerging Diseases: Influenza (H1N1, H5N1), COVID-19
5. Intestinal: Diarrhoea, Typhoid, Worm infestations
6. Sexually Transmitted Infections, including HIV and AIDS
7. Vector-borne Diseases Control Programmes: Malaria, Dengue, Japanese Encephalitis, Chikungunya, Leptospirosis,
8. Zoonotic: Rabies, Monkeypox
9. Neglected tropical diseases: Scabies, Filiarisis, Leishmaniasis (Kala Ajar)

Suggested reading:

1) Textbook of Medicine : Cecil, Bennett, et al., Harcourt Brace Joanvich Inc. U.S.A.
2) Nelson K E : Infectious disease epidemiology : theory and practice
3) GrieseckeJ : Modern infectious disease epidemiology
4) National Disease Control Programmes websites and class handouts
5) Expert Committee Report on Public Health Systems in India 1996

SHS557OEP: Advanced Epidemiology (Practical)

Course Objectives

- To understand the applications of epidemiology in public health surveillance
- To apply principles of epidemiology in public health practice

Course Outline

1. Models in Epidemiology: SIR Model – the study of the population of susceptible (S), infectious (I) and recovered (R) or removed
2. Global Burden of Diseases and Disability Adjusted Life Year (DALY): Methodology, Estimates and Application
3. Purpose and Characteristics of Public Health Surveillance
4. Identifying Health Problems for Surveillance
5. Identifying or Collecting Data for Surveillance
6. Analyzing and Interpreting
7. Disseminating Data and Interpretations
8. Evaluating and Improving Surveillance
9. Integrated Disease Surveillance and Integrated Health Information Platform in India

Suggested reading:

1) Blanchard J; Washington R; Becker M; Vasanthakumar N; Madangopal K; Sarwal R. et al. Vision 2035: Public Health Surveillance in India. A White Paper. NITI Aayog. December 2020
2) Detels, Roger and others (eds), 'Public health surveillance', in Roger Detels and others (eds), Oxford Textbook of Global Public Health, 7 edn, Oxford Textbooks in Public Health (Oxford, 2021; online edn, Oxford Academic, 1 Nov. 2021), https://doi.org/10.1093/med/9780198816805.003.0042, accessed 12 July 2023.
3) Gordis Leon. Epidemiology (Fifth edition), Elsevier Saunders, 2013.
4) Dona Schneider and David E. Lilienfeld. Lilienfeld's Foundations of Epidemiology, Fourth Edition, Oxford University Press, USA, 2015.
5) Porta Miquel. A Dictionary of Epidemiology, Oxford University Press, USA, 2014
6) Spassoff R.A. Epidemiologic Methods for Health Policy, Oxford University Press, 1999
7) Barkar, D.J.P., Practical Epidemiology: Churchill pub, Livingstone, 1991.
8) Knox E. G. Epidemiology in health care planning: A Guide to the Uses of a Scientific Method, Oxford University Press, USA.

SHS558OEP: Applied Research Methods (Practical): 4 Credits

Course objectives:

- To introduce students to quantitative research methods in public health including issues of ethics and biosafety
- To train students in the method of analysis of data and report writing. The information from this course will be subsequently used for planning health interventions.

Course outline:

1. Types of research; steps in conducting research
2. Ethics in research
3. Survey Methods and their application to public health research
4. Survey design and planning, sampling, construction of questionnaire,
5. Data collection, analysis
6. Report writing

Suggested reading:

1) Health Research Methodology: A guide for training in research methods. Second
2) Edition. WHO, 2001.
3) Kothari, C.R., 1990. Research Methodology: Methods and Techniques. New Age
4) International. 418p.
5) John Creswell (2013). Research Design: Qualitative, Quantitative, and mixed methods approaches. Fourth edition, Sage Publications
6) ICMR, 2018 Ethical Guidelines for Biomedical Research on Human Participants, ICMR,
7) New Delhi.

SHS559OE: Monitoring and Evaluation of Programmes: 2 Credits (T)

Course objective

- To expose students to the methods of monitoring and evaluation in the broader framework of health and nutrition programmes.
- To build students capacity to develop framework for monitoring and evaluation independently

Course outline:

1. Introduction to monitoring and evaluation: difference between monitoring and evaluation
2. Programme Logic models and Theory of change
3. Deciding on key aspects of the program to monitor, identifying data sources, designing sound data collection and collation tools
4. Evaluation principles and approaches for field-based programs, identifying evaluation questions and developing a learning agenda, selecting an appropriate evaluation design, Collecting evaluation data
5. Developing Objectives and indicators for M&E : quantitative and qualitative indicators
6. Evaluation: types, evaluation question,
7. Identifying program stakeholders and their information needs
8. Selecting appropriate communication tools for different audiences

Suggested readings:

1) Gertler, P.J., Martinez, S., Premand, P., Rawlings, L.B., Vermeersch, C.M.J., 2016. Impact Evaluation in Practice, Second Edition. The World Bank. https://doi.org/10.1596/978-1-4648-0779-4
2) Martin Kellermann 2019. Monitoring and Evaluation: Performance and Impact of the QI Reforms. https://doi.org/10.1596/978-1-4648-1372-6_ch12
3) Janus, S.S., 2016. Monitoring and Evaluation, in: Becoming a Knowledge-Sharing Organization: A Handbook for Scaling Up Solutions through Knowledge Capturing and Sharing. The World Bank, pp. 111–125. https://doi.org/10.1596/978-1-4648-0943-9_ch8
4) Goergens, M., Kusek, J.Z., 2010. Making Monitoring and Evaluation Systems Work. The World Bank. https://doi.org/10.1596/978-0-8213-8186-1
5) Class handouts

SHS560OEP: Implementation Research (Practical)

Course Objectives

- To orient students in understanding challenges in implementation
- To exemplify how implementation research approaches and methods enable successful implementation

Course outline:

1. Contextualizing implementation research issues: Need for research on implementation challenges
2. Application of implementation research
3. Approaches used in implementation research: Case studies
4. Implementation research designs/frameworks: Consolidated Framework for Implementation Research, Mixed methods research and participatory approaches
5. Data analysis and presentation in implementation research
6. Monitoring and evaluating implementation research projects: case studies

Suggested Readings:

1. World Health Organization & UNICEF/UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases. (2014). Implementation research toolkit. World Health Organization. https://apps.who.int/iris/handle/10665/110523
2. Peters, David, Tran, Nhan, Adam, Taghreed, Alliance for Health Policy and Systems Research & World Health Organization. (2013). Implementation research in health: a practical guide / edited by David Peters … [et al]. World Health Organization. https://apps.who.int/iris/handle/10665/91758
3. Binagwaho A, Frisch MF, Udoh K, Drown L, Ntawukuriryayo JT, Nkurunziza D, Donahoe KB, Hirschhorn LR. Implementation Research: An Efficient and Effective Tool to Accelerate Universal Health Coverage. Int J Health Policy Manag. 2020 May 1;9(5):182-184. doi: 10.15171/ijhpm.2019.125. PMID: 32563218; PMCID: PMC7306110.

SHS561OE: Disaster Management: 2 Credits (T)

Course objectives

- To introduce students to natural and man-made disasters and mitigation principles

Course outline

1. Introduction to Natural & Man-made Disasters
2. Disaster Preparedness: Disaster Preparedness Plan, Disaster Preparedness for People and Infrastructure, Role of Technology in Disaster Preparedness
3. Disaster management: Hazard, Risk and Vulnerability, Concept and Relationship, disaster Risk Reduction, risk Analysis Techniques, People Participation in Risk Assessment
4. Disaster Mitigation: Disaster Mitigation Strategies, Emerging Trends in Disaster Mitigation, Role of Team and Coordination,
5. Rehabilitation, Reconstruction & Recovery
6. Disaster Response: role and responsibilities of different governmental organizations at local, district, state and central level

Suggested reading:

1. Taori, K (2005) Disaster Management through Panchayati Raj, Concept Publishing Company, New Delhi.
2. Roy, P.S. (2000): Space Technology for Disaster management: A Remote Sensing & GIS Perspective, Indian Institute of Remote Sensing (NRSA) Dehradun.
3. Sharma, R.K. & Sharma, G. (2005) (ed) Natural Disaster, APH Publishing Corporation, New Delhi.

SEMESTER II: INTERNSHIP/ ON JOB TRAINING (OJT)

SHS581OJT: Internship: 4 Credits (Practical)

Course objective:
To provide an understanding of day-to-day activities and functions of professionals working in the public health system

Course outline

- Four-weeks internship at a public health facility, or with a disease control programme.
- Assessment through activity diary, journal and report submission and presentation.
- Evaluation criteria will be updated once informed by the State Government of Maharashtra.

SEMESTER III: MAJOR CORE COURSES

SHS601MJ: Epidemiology of Non-communicable Diseases

Course Objectives:

- To give an understanding of the pathophysiology of major NCDs. Classification, clinical manifestations, diagnosis and, treatment.
- To understand the risk factors for common NCDs, and methods of disease control and health promotion
- To give an understanding of the pathophysiology of some common mental health problems

Course outline:

1. Epidemiology of NCDs, risk factors, global status, prevention and control, global initiatives
2. National strategies for control of NCDs (epidemiology, pathophysiology including biochemical and genetic parameters, cardinal signs, clinical and diagnostic features (with particular emphasis on biochemical parameters), treatment (emphasize pharmacological component), prevention and control
   a. Diabetes
   b. Cardiovascular diseases
   c. Asthma and COPD
   d. Cancer
   e. Musculoskeletal conditions
3. Tobacco, obesity and other risk factors for NCDs
4. Unintentional Injuries- prevention and control; global and national strategies

Suggested reading:

1) Class handouts
2) World Health Organization (2016). Global Report on Diabetes. WHO Press, Switzerland
3) National Centre for Disease Control Director General of Health Services Ministry of Health and Family Welfare, GOI 2017. Training Module for Medical Officers for Prevention, Control and Population Level Screening of Hypertension, Diabetes and Common Cancer (Oral, Breast and Cervical). National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke
4) World Health Organization 2014: GLOBAL STATUS REPORT on Non-Communicable Diseases
5) World Health Organization 2013: Global Action Plan for the Prevention and Control of Non-Communicable Diseases, 2013-2020, WHO, Geneva, Switzerland
6) Standard Treatment Guidelines: Hypertension Screening, Diagnosis, Assessment, and Management of Primary Hypertension in Adults in India- Quick Reference Guide May 2016 Ministry of Health and Family Welfare, Government of India
7) Prevention of cardiovascular disease: guidelines for assessment and management of total cardiovascular risk: World Health Organization. ISBN 978 92 4 154717 8 (NLM classification: WG 120) © World Health Organization 2007

SHS602MJ: Maternal Health

Course objectives

- To orient students to the physiological changes, health problems, health needs of women during pregnancy, labour and postpartum period
- To describe and critically analyse public health programmes, services, and initiatives to reduce maternal mortality and improve maternal health

Course outline

1. Introduction and concept of reproductive health
2. National RCH program, NHM, RMNCH strategy, HR training, skill lab, NFHS 5 indicators maternal health, FP.
3. Antenatal care Coverage, quality, Govt schemes, ANC screening, interventions
4. Intrapartum care, SBA, Partograph, safe childbirth checklist, LaQshya program
5. Complications during pregnancy, measures to prevent
6. Complications during labour
7. Postnatal care, Complications and pevention
8. Maternal Mortality, MDSR, Emergency Obst & newborn care
9. Abortion, MTP, Family Planning

Suggested Readings

1. Dutta D C. Textbook of Obstetrics: Including Perinatology and Contraception. Jaypee Brothers Medical Publisher Ltd. New Delhi. 8th Edition 2016
2. Dutta D C Textbook of Gynaecology. JAYPEE BROTHERS MEDICAL PUBLISHERS (P) LTD New Delhi 6th edition 2013

SHS603MJ: Applied Immunology

Course objectives

- To understand the role of immune system in human infectious diseases
- To understand the role of immune system in non-communicable diseases
- To understand applications of immunology in prevention and diagnosis of common human diseases

Course Outline:

1. Immunoassays: Immunoassays based on Antigen-antibody specificity and their applications in diagnosing human diseases, monitoring the level of the humoral immune response, and identifying molecules of biological or medical interest.
2. Immune system and infectious diseases: Immunology of selected infectious diseases of public health importance, how various types of pathogens (viral, bacterial, parasitic, protozoan) evade the immune system, how the immune system responds to various types of pathogens. Emerging and re-emerging diseases in humans.
3. Immune system and non-communicable diseases: Immune system in non-communicable diseases. Example Cancer- immune responses that develop against cancer cells, as well as the methods by which cancer cells manage to evade those responses.
4. Vaccines and Vaccination: Active and passive immunization, importance in public health, types of vaccines

Suggested reading:

1) Essential Immunology: - Ivan Roitt, Blackwell scientific publications, London Edinburgh Boston, Australia, 1997.
2) Immunology : Janis Kuby, W.H. Freeman and company, U.S.A.1992
3) Immunobiology : The immune system in health and disease: J. Travers, current biology pub, New York, 1997.
4) Vaccines Prospects and perspectives: Harmindar Sing, Rajesh Bhatia, Forward pub. Co., Delhi, 1993
5) Relevant documents and Suggested texts therein from the WHO website
6) WHO Technical Publications: Vaccines, Human Genetics Program series.
7) Harrison's Principles of Internal Medicine 16th Ed.-2005

SHS604MJP: Laboratory Methods in Health Sciences II: 4 Credits Practical(P)

Course objectives:

- To equip Health sciences students with molecular biology skills useful for biomedical research

Course outline:

1. DNA Isolation, quantification, gel electrophoresis,
2. Polymerase Chain Reaction
3. RNA isolation, quantification, gel electrophoresis
4. cDNA preparation and Real-Time PCR
5. Restriction Digestion of DNA
6. SDS PAGE and western blotting demonstration

Reference

Michael R. Green & Joseph Sambrook (2012). Molecular Cloning: A laboratory manual.Fourth edition, Cold Spring Harbor Laboratory Press

SHS605MJP: Research Proposal Development (P): 2 Credits

Course objectives:

- To impart training in the methodology of developing a research proposal and scientific writing

Course outline:

Students will write a research grant or fellowship application including ethical guidelines and other regulatory requirements. Students are expected to select a topic, conduct a literature review, identify a research gap, frame research questions, develop objectives, study hypothesis, select a study design, write the detailed methodology, develop the analysis format including statistical tests to be applied

SEMESTER III: MAJOR ELECTIVE COURSES

SHS606OE: Child Health and Nutrition (T): 2 credits

Course objectives:

- To introduce students to the science of child growth& development
- To orient students about the issues related to neonatal and child health, nutrition and mortality

Course Outline

1. Growth and development: Growth and development; physical, motor, cognitive, psycho-social and language development.
2. Neonatal Health: major causes of neonatal mortality; Preterm births, low birth weight and public health interventions; birth defects
3. Early infant nutrition:
   Colostrum, Breastfeeding- Importance, benefits, human milk vs animal milk
   Formula Feeding.
4. Immunization; coverage, factors
5. Infant Nutrition:
   Nutrient Requirement
   Complementary feeding.
   Introduction of liquid to solid to table food.
6. Levels and trends in child mortality, major causes of infant and child mortality and public health interventions
7. Policy and programmes: the main national and international interventions for prevention of reproductive and childhood/adolescent morbidity and mortality, including RMNCHA+, JSSK, RBSK, IYCF, IMNCI, maternity benefit schemes

Suggested reading:

1. Vinod K Paul and Arvind Bagga**:** GHAI Essential Pediatrics. CBS Publisher and Distributors, 10th Ed. 25 March 2023
2. Class handout

SHS607OE: Mental Health (T): 2 Credits

Course Objectives:

- Understanding the burden of mental health disorders in India
- To give an understanding of the pathophysiology of some common mental health problems

Course Outline

1. Epidemiology of major mental disorders in India going by latest GBD studies.
2. Major Depressive Disorders, Anxiety Disorders, Idiopathic developmental intellectual disability (IDID), Schizophrenia, Bipolar disorder, Conduct disorder (CD), Eating Disorders: Anorexia nervosa, Bulimia nervosa, Autism spectrum disorders (ASD), Attention-deficit/hyperactivity disorder (ADHD), Personality Disorders

Suggested Readings

1. The burden of mental disorders across the states of India: the Global Burden of Disease Study 1990–2017. The Lancet Psychiatry. Volume 7 Issue 2 Pages 148-161 (February 2020). DOI: 10.1016/S2215-0366(19)30475-4
2. American Psychiatric Association (2013) Diagnostic and statistical manual of mental disorders: DSM-5. 5th Edition. Washington, D.C.: American Psychiatric Publishing

SHS608OE: Nutrition Practicum (P): 4 Credits

Course objective:

- To orient students to the research methods in the field of public health nutrition.
- To develop their skills in nutrition research methods and to update them with the current techniques in nutrition research.

Course outline:

1. Principles of nutritional epidemiology
2. Nutritional Survey, Surveillance, Monitoring and Evaluation
3. Tools and Techniques:Anthropometry
   a) Height and weight measurements
   b) BMI, Z score, WHO software's: Anthro, Anthroplus
   c) Circumference measurements- MUAC cut offs: SAM , MAM , Old classisification in comparision with new. Other circumferential measurements
   d) Skinfold measurement
   e) Comparison to standards
   f) Technical error of measurement
   g) Growth charts- growth monitoring, Types of charts, target height, percentiles, deriving third percentile.
4. Dietary and Nutrient intake analysis – Energy expenditure, energy balance, Diet recall, Food frequency, Weighment method, comparison with standards; Units of measurement in foods, Standardisation of foods for portion sizes, Nutritional questionnaires
5. Nutritional screens - Physical examinations for clinical signs and symptoms, Biochemical assessment methods, cut offs.
6. Standards for comparison – RDA, NCHS standards, ICMR standards

Suggested reading:

1. Willett, W. (2012). Nutritional epidemiology. Oxford University Press.
2. Margetts, B. M., & Nelson, M. (Eds.). (1997). Design concepts in nutritional epidemiology. OUP Oxford.
3. Frisancho, A. R. (1990). Anthropometric standards for the assessment of growth and nutritional status. University of Michigan Press.
4. Cohen, B. E. (2002). Community food security assessment toolkit (pp. 02-013). Washington, DC: US Department of Agriculture, Economic Research Service.
5. Billig, P., Bendahmane, D., & Swindale, A. (1999). Water and sanitation indicators measurement guide. Food and Nutrition Technical Assistance Project, Academy for Educational Development.
6. World Health Organization. (1995). The use and interpretation of anthropometry: report of a WHO expert committee. World Health Organ Tech Rep Ser., 854, 312-409.

SHS609OE: Basics of Pharmacology: 2 Credits

Course objective:

- To provide health sciences students with basic understanding of pharmacology and drug discovery and development process

Course Outline

1. Introduction to pharmacological sciences, branches: Pharmacology, Pharmacognosy, Pharmaceutical Chemistry, Toxicology, Pharmaceutics

2. Definition and concepts of drugs, routes of drug Administration

3. Sources and classification of drugs: Synthetic, semi-synthetic and natural products including plant, animals, microbes and fungi with special reference to marine organisms. Pharmacological classifications and chemical classification

4. Introduction to Pharmacokinetics, Pharmacodynamics Adverse Drug Effects, Adverse Drug Events, Definitions of Drug, disease, leads, receptors, targets, pharmacophore, new chemical entity (NCE), new molecular entity (NME), new drug application (NDA), abbreviated new drug application (ANDA) etc.

5. Drug discovery and Development phases: Rational Drug Discovery Approach Phase I, II III and IV, Introduction to Pharmacovigilance, Pharmacoepidemiology, Bioavailability and Bioequivalence (BABE)

6. Introduction to Regulatory guidelines and regulatory bodies, FDA, CPCSEA, Pharmacopoeias (IP, API, etc.), ICH.

References:

1. Bhushan Patwardhan and Rathnam Chaguturu.Innovative Approaches in Drug Discovery, 1st Edition 2016. Academic Press. ISBN: 978-0-12-801814-9. http://store.elsevier.com/Innovative-
2. Approaches-in-Drug-Discovery/Bhushan-Patwardhan/isbn-9780128018149/
3. Bramhankar D. M, Jaiswal S. B, Biopharmaceutics and pharmacokinetics: A Treatise, 3rd edition,Vallabh Prakashan.
4. Tripathi K.D.: Essentials of Medical Pharmacology, 7th edition, Jaypee Brothers, Medical Publishers, New Delhi.
5. Rang H.P. and Dale M.M.: Pharmacology, 9th edition Churchill Livingstone, Edinbergh
6. Remington: The Science and Practice of Pharmacy, Volumes 1-2, 22nd edition, 2012, Edited by Allen L V, Adeboye A, Shane P D, Linda A F, Jointly published by Pharmaceutical Press and Philadelphia College of Pharmacy at University of the
7. Kokate C. K., Gokhale S.B. and Purohit A.P., Textbook of Pharmacognosy, Nirali Prakashan, Pune, 2008, ISBN: 8185790094.
8. Kuchekar B.S., Forensic pharmacy, 9th edition. Nirali Prakashan.

SEMESTER III: Research Project in Health Sciences

SHS631RP: Research Project in Health Sciences - I (P): 4 Credits

Course objective:

The purpose of research project is to encourage students to undertake independent research and to foster research-related skills, which should benefit future study and employment.

Each candidate for the Masters of Public Health (MPH) is required to undertake a research project in Semester III and completes it by end of Sem IV. The research project must exhibit original investigation, analysis and interpretation. The research project is to be done with research supervisor.

Initiate research and formulate feasible research questions

Design, develop tools and conduct original research

Synthesize literature and conduct analyses

Present research findings and argument in a suitably structured and sequenced manner

SEMESTER IV: MAJOR CORE COURSES

SHS651MJ: Bioethics and Clinical Studies (T): 4 Credits

Course objectives:

- To introduce students to the ethical principles and practices in public health research
- To introduce students to the existing guidelines

Course outline:

Unit 1

1) Introduction to Bioethics – principles and history
2) National Ethical Guidelines for biomedical and health research
3) Regulations for medical devices, drug and biological material regulations
4) Publication ethics and regulations – introduction; fabrication, falsification, or plagiarism; ethics in scientific publications, guidelines and best practices of publications, committee of publication ethics

Unit 2

5) Introduction to Clinical research: clinical research designs, clinical trial, conduct and regulation
6) History of the development of the clinical trials research process
7) Introduction to the phases of clinical trials research
8) Designing trials: Trial size, Field organization and ensuring data of high quality, Trial design, Single and multicentre trials
9) Techniques for randomization
10) Challenges in conducting clinical trials: Data collection, management and monitoring endpoints, Recruitment and retention of trial participants, community engagement, preparing and implementing Standard Operating Procedures (SOP's), recording of Adverse events and serious adverse events (SAE's), Interim monitoring
11) Introduction to field trials of health interventions and Phase IV studies
12) Quality Control

Suggested reading

1. National Ethical Guidelines for biomedical and health research involving human participants. ICMR, 2017
2. Guidelines and e-learning tools of Committee of Publication Ethics
3. CDSCO, 2013. Regulations and Guidelines Specific to Ethics Schedule Y & CDSCO-GCP.,
4. Available on www.cdsaindia.in/sites/default/files/02_Regulations_Dr.Bangaruranjan.pdf
5. CONSORT Checklist-CONSORT statement. 2010. Available on www.consortstatement.
6. org/media/default/downloads/consort2010
7. The University of Illinois at Chicago. Evidence Based Medicine: PICO. Available on
8. http://researchguides.uic.edu.

SHS652MJ: Environment, Health and Disease (T): 2 Credits

Course Objectives:

- To sensitize students to the environment as a determinant of health
- To introduce students to sources of environmental health hazards
- To introduce students to policies/regulations to protect the environmental health

Course outline:

1. Introduction to environmental toxicology: definition and terminologies (poison, toxic agent, toxicity, toxicant, concept of dose, dose-response, factors affecting responses to a toxic agent
2. Sources of environmental health hazards: mechanisms of exposure, classification, bioaccumulation, biomagnification

   Toxic metals: Effects on women and children, Examples: mercury, lead

   Pesticides & organic chemicals: endocrine disrupting chemicals and their effect on health with special reference to human reproduction and development

   Radiations: Exposures to ionizing and non-ionizing radiations and impact on health, indices examples: Goiania accident,

   Air pollution: Impact on health, Air quality standards-Air Quality Index, National Ambient Air Quality Standards, Initiatives for Control of Air Pollution
3. Climate change and its impact on health
4. Environmental policy: Indian context: Ministry of Environment, Forest and Climate Change (MoEFCC) The National Conservation Strategy and Policy Statement on Environment and Development, 1992, National Forest Policy, 1988, Policy Statement on Abatement of Pollution, 1992,National Environment Policy, 2006
5. Regulations to protect environmental health: Agencies involved in adoption and implementation of environmental policies: U.S. EPA, NIOSH, ATSDR, EEA, NIEHS, WHO.

Reading

1.Robert H. Friis.Essentials of Environmental Health Ed.by Richard Riegelman, Jones and Bartlett publishers
https://cpcb.nic.in/upload/NAAQS_2019.pdf
2. relevant papers and class handouts will be given

SHS653MJ: Applied Human Genetics (P): 2 Credits

Course Objectives:

- To introduce students to the methods in studying human inheritance
- To introduce students to genetic testing and counselling
- To provide overview of the genetic basis of human diseases
- To introduce students to application of genomic analysis in aspects of human
- health and disease

Course outline:

1) Recombination and genetic diversity
2) Single gene alterations: concept of genotype, phenotype; patterns of inheritance, characteristic features, molecular pathology and management of single gene disorders, pedigree analysis, problem solving based on mendelian inheritance
3) Genetic testing, counselling and ethical issues
4) Diseases with a genetic predisposition: polygenic models of disease, gene-environment interactions, Examples of Diabetes, obesity, CVD
5) Introduction to Epigenetics in health and disease
6) Human Genomics: Introduction to concepts, Sequencing technologies: Sanger, Next gen, Exome sequencing, whole -genome sequencing, exome-sequencing, metagenomics and their applications

Suggested reading:

1. Molecular Biology of Cell, Alberts et al, Garland; 5th edition 2008
2. Molecular Cell Biology, Lodish et al, W. H. Freeman; 5 edition, 2003
3. Concepts of Genetics, Klug and Cummins, 7 th edition, Prentice Hall, 2002
4. Human Molecular Genetics, Strachen and Read, 4th edition, BIOS Scientific Publishers, 2010
5. Genes VII, Lewin et al, Oxford University Press, USA 1999
6. Medical genetics, Prichard and Kroff, 3 rd edition, Mosby; 2005
7. Essential Genetics : A genomics perspective, Daniel. L. Hartl and Elizabeth W. Jones, Fourth edition.

SHS654MJP: Data Sciences for Health Research (P): 4 Credits

Course Objectives

1) To introduce to the advances in data science and its application for health research
2) To provide a hands on experience of handling software for data management and analysis

Course outline

1) Introduction to Data Science – types of data, data management (data capture, data cleaning, data processing), revision of data analysis software (SPS)
2) Data analysis – exploratory data analysis, handling missing data, data modelling, bias in data analysis; advance analysis - predictive analysis, data mining, causal analysis,
3) Data visualization and reporting – data arrangement and visualizing techniques
4) Data science tools – introduction to R Studio and Python, online applications for data science
5) Artificial Intelligence – introduction to AI, introduction and applications of machine learning, deep learning, natural language processing
6) Generative AI and case studies in health research
7) Ethics in advancing data science – data ethics, ethics and artificial intelligence, guidelines and standards for data science applications
8) Data science and health research – role of a data scientist in health research, case studies on data science project

Suggested reading:

1. **Reviews and papers, Pubmed**

SEMESTER IV: MAJOR ELECTIVE COURSES

SHS655OEP: Health Research Communication (P): 2 Credits

Course Objectives:

- To orient students to scientific communication of health research expected on various media and platforms
- To introduce best practices, standards, and guidelines of scientific communication
- To impart communication skills for various types of verbal and written communications

Course Outline:

1. Introduction to Scientific Communication: Communication theories, knowing target audience, levels of communication, scientific communication platforms, processes, dynamics, principles, skills, and output of science communication
2. Conference presentations: techniques and skills of oral and poster presentations, predatory conferences
3. Science communication through social media: science bogs, social media posts, writing for websites, dos and don’ts while facing media as health care professionals
4. Business communication: drafting press releases, business communications, parent-child communication, patient-provider communication, communication development
5. Verbal communication: elevator speech, podcasts, radio talks
6. Writing for scientific journals: types of research papers, journal selection, predatory journals and predatory publishers, best practices
7. Writing reports and assignments: writing dissertations, doctoral thesis, project reports, reports on clinical trials and observations studies, writing regulatory reports such as FDA submissions
8. Standards and guidelines for scientific publications: Guidelines for various types of research reports and study designs, Equator Network, ICMJE guidelines, standards for scientific publications

References:

1. Online material: Equator Network (www.equator-network.org), World Association of Medical Journal Editors (www.wame.org), Committee of Publication Ethics (https://publicationethics.org)
2. Relevant ICH and FDA guidelines

SHS656OEP: Tribal Health (T): 2 Credits

Course objectives:

- **To orient students with health issues of tribal population of India**

Course outline

1) Meaning and concept of tribe: Overview of territorial distribution and classification of tribal groups in India , features/ tribal culture & identity
2) Contemporary tribal health issues: tribal health indicators, trends and patterns
3) Nutrition and Food Security in tribal regions
4) Tribal development, displacement, rehabilitation and its impact on health
5) Ethno-medicine, forest resources and tribal health
6) Tribal health programmes, strategies, initiatives and schemes

Suggested reading

1) Tribal health report: First Comprehensive Report on Tribal Health in India: Report of the expert committee on tribal health
2) National Family Health Survey (NFHS) – 1, 2, 3, 4, 5
3) Lancet: Maternal and Child Health series – 2018
4) Lancet: Indigenous Health series: 2010
5) R. K. Mutatkar. Tribal Health and Malnutrition.2018. Concept Publishing Company Private Ltd, New Delhi, India
6) Salil Basu. Dimensions of Tribal Health in India. Health and Population- Perspectives and Issues 23(2): 61-70, 2000
7) National Health Mission Programmes on Tribal Health Issues (Tribal RNTCP action plans, AIDS control programmes, NVBDCP, RCH-II)

SHS657OE: Human Molecular and Cellular Biology (T): 2 Credits

Course objectives:

- To provide basic understanding of human molecular and cellular biology in health and disease.

Course outline:

1) Structure and diversity of human cells, Intracellular organization. Cell cycle- Different phases of cell cycle, Controls and Check points, cyclins and cdks – types and their role. Cell proliferation, senescence and programmed cell death (Importance in different life stages)
2) Cell Signaling and Signal Transduction: Important classes of cell signalling molecules in humans (Hormones, growth factors, cytokines), cell adhesion, extracellular matrix, receptors-intracellular, cell surface receptors, endocrine, paracrine and autocrine signalling Second messengers.
3) Introduction to rDNA technologies, Next Gen Sequencing and its applications
4) Stem cells and differentiation: Role in early human development and renewal of mature tissues
5) Pharmacogenetics, Personalized Medicine, and Population Screening
6) Epigenetics: Mechanisms and role in human health

Suggested reading:

1. Tom Strachan and Andrew Read. Human Molecular Genetics, 4th Edition, Garland Science.
2. Geoffrey M Cooper and Robert E. Hausman. The Cell: A Molecular Approach. 4th Edition, ASM Press.

SHS658OE: Disability and Public Health (T): 2 Credits

Course objectives

- To introduce students to disability as a public health issue
- To identify needs of the disabled and find ways to address the issues that the disabled face in developing countries

Course outline:

1. Defining disability: evolving concept of disability, medical model, social model and human rights perspective of disability, UNCRPD and ethics
2. Data sources and estimating disability: global and national level data sources, trends in developed and developing countries, epidemiological data on types of disabilities
3. Disability across life course: birth defects, children with disabilities, preventable disability, developing preventative strategies
4. Disability in society: Stigma and discrimination, identify and analyze societal barriers and supports that affect the lives of people with disabilities.
5. Barriers to care: physical and environmental barriers, health and social care needs , accessibility, availability and affordability of health services
6. Assistive Technology: innovation, interventions, rehabilitation, reablement
7. Public health programmes and policy: overview of policy, programmes,

Suggested reading:

1) Drum C.E. Krahn G.L., Hank Bersani Jr. Disability and Public Health. Washington, USA: American Public Health Association. Washington USA. 2016 Print ISSN: 0090-0036 | Electronic ISSN: 1541-0048
2) Lollar D.J, Anderson, ElenaM (eds) Public Health Perspectives on Disability: Epidemiology to Ethics and Beyond. USA: Springer Publication, 2011. ISBN 978-1-4419-73412
3) Berghs M, Atkin K, Graham H, Hatton C, Thomas C. Implications for public health research of models and theories of disability: a scoping study and evidence synthesis. Published by Public Health Res div of National Institute for Health research. 2016.
4) Beyrer C, and Pizer HF, (eds). Public health and human rights; evidence-based approaches. Baltimore, MD: The Johns Hopkins University Press, 2007.
5) Jean O'Hara Jane McCarthy Nick Bouras. Intellectual Disability and Ill Health - A Review of the Evidence .Cambridge University Press India Pvt Ltd, 2010. ISBN: 9780521728898, 0521728894

SHS659OE: Health Economics (T): 2 Credits

Course Objectives

- To impart knowledge on health care financing and health economics, including cost-benefit and cost-utility analysis.

Course Outline

1) Health financing, budgeting and economics
2) Overview of Health Financing in Developing Countries
3) Health financing concepts such as cost and cost classification
4) Budget management
5) Cost-effective analysis, Cost-benefit analysis and Cost-Utility analysis;
6) Economic analysis reporting for projects
7) Health insurance in India: Private insurance, community-based insurance schemes

Suggested Reading

1. Essentials of Health Economics: Diane M. Dewar, series editor: Richard Rigelman, United states, 2010
2. Health Economics: Peter Zweifel and Friedrich Breyer, Oxford University Press, New York, 1997
3. Health Program planning and evaluation A practical, Systematic approach for community Health; L. Michele Issel Jones and Bartlett Publishers, Canada,2009
4. Health economics, an International Perspective; BarbaraMcpake, LilaniKumaranayake and Charles Normand, Routledge, Taylor & Francis Group, New York, 2006
5. Health Economics in India (Edited), Prashant Panda and Himanshu Rout, New Century Pubns, 2007

SHS660OE: Healthy Aging (T): 2 Credits

Course Objectives:

1) To provide an overview of demographic, social, psychological and health issues related to population ageing
2) To expose students to the health status of older adults, burden of diseases and disability and challenges to public health

Course outline:

1) Demographic trends and issues related to population ageing: implications for public health
2) Healthy ageing: normal and pathological ageing, wellbeing during old age, strategies to promote health during old age
3) Functionality and Disability in older adults: functionality, fall, frailty, sarcopenia, trajectories of functional decline, implications for public health,
4) Nutrition of older adults: undernutrition, obesity, nutritional efficiencies in old age, dietary recommendations
5) Cognitive ageing: MCI, Dementia, Alzheimers, implications for individuals, families and society, and Caregiving
6) Health and social care needs of older adults: Historical shifts in position, family care giving, current social care giving needs of ageing adults, long term care, role of hospice& institutions in providing care
7) Policy and programmes for welfare of older adults: Policies and programs from India and around the world that support healthy ageing will be examined.

Suggested reading:

1. Albert S.M.2014. Public Health and Aging: An Introduction to Maximizing Function and Well-being. USA: Springer publication
2. Schweda,M. Larissa Pfaller, Kai Brauer, Frank Adloff, Silke Schocktanz. 2017. Planning later life: bioethics and public health in ageing societies: Routledge

SEMESTER IV: RESEARCH PROJECT (RP)

SHS681RP: Research Project in Health Sciences - II (P): 6 Credits

Course objective:

The purpose of research project is to encourage students to undertake independent research and to foster research-related skills, which should benefit future study and employment.

Each candidate for the Masters of Public Health (MPH) is required to undertake a research project in Semester III and completes it by end of Sem IV. The research project must exhibit original investigation, analysis and interpretation. The research project is to be done with research supervisor.

Initiate research and formulate feasible research questions

Design, develop tools and conduct original research

Synthesize literature and conduct analyses

Present research findings and argument in a suitably structured and sequenced manner