

**DEPARTMENT OF EPIDEMIOLOGY AND
PUBLIC HEALTH**

**CENTRAL UNIVERSITY OF TAMIL
NADU**

THIRUVARUR



**M.Sc., EPIDEMIOLOGY AND PUBLIC HEALTH
(EPH)**

(2 Year Course, Semester Pattern)

Course Contents

2020-21

Rules, Regulations & Syllabus

DEPARTMENT PROFILE

The Department of Epidemiology and Public Health was established in August 2016. It offers two years Master Degree in Epidemiology and Public Health. The Department provides teaching, research, and field/ lab based academic activities that helps public health practitioner, health care providers, and researchers to develop and apply population based approaches to maintain and improve the public health in the heartland and the nation.

The M.Sc., degree in EPH (Epidemiology and Public Health) is offered through the Department of Epidemiology and Public Health, at CUTN. This programme provides students with strong foundation in Epidemiology, Biostatistics, complemented by Qualitative and Behavioural Sciences.

Student Eligibility Criteria: Students with graduation in Medical Sciences, Paramedical Sciences, Health Sciences, Biological Sciences, Biomedical Sciences, Veterinary Science, Microbiology, Biochemistry, Biotechnology, Biology and Life sciences are eligible to apply.

Student selection, joining, reservation, relaxation and all other procedures shall be completely based on the rules, regulations and norms of the University.

Duration of the Course: The duration of the course is TWO academic years (Semester Pattern).

Medium of Instruction: English shall be the medium of instruction for all subjects of study and examinations of the Course.

Credit Grade Point Requirements

A student enrolled for the Master's degree program to earn eligibility for the degree is required to complete 73 credits as detailed below:

Attendance Required for Appearing for Examination: A candidate shall be permitted to appear for the end semester examination in any particular subject only if the candidate secures not less than 75% of the attendance (in terms of the total number of contact hours for the subject) during the year.

Evaluation of Student Performance

Assessment	Theory	Practical
Internal	40	40
Final theory	60	
Final practical		60

Final Examinations

Theory Examinations Assessment (as with CUTN regulations).

The pattern of practical part should be uniform across the departments.

Grading

- The student should secure 60 per cent marks separately in theory and practical and 65 per cent marks in aggregate to secure a pass in the subject. Students who secure marks below 65 per cent in a subject will be treated as reappearance (RA).
- Each subject shall carry a maximum of 100 marks for purpose of grading. The grading shall be done as grade point, i.e., the percentage of marks earned in a subject is divided by ten. The grade point is expressed on a 10 point scale up to two decimals.

- The reappearance examinations for the candidates who fail in a subject or subjects will be held in the subsequent semester.
- Students who did not fulfil the required minimum attendance of 70% will be awarded 'E' grade and has to repeat the subject

Dissertation:

For the successful completion of degree each student has to finish a dissertation with 10 credit hours in their final semester. Each student will be assigned a supervisor from the department after the completion of their first semester. The dissertation will be either field based or core laboratory based. Progress of dissertation will be monitored by each supervisor on weekly basis either through students' presentation or as decided by the advisor. After completion of the work, student needs to present their research work in front of department research council (DRC) and external examiner which is not from the same university. Finally student should submit three copies of thesis. Thesis will be evaluated and scored.

Vision of the Department: Capacity building and skilful training to students on Public Health

Mission of the Department:

M1. To provide trans-disciplinary research approach to students to create and communicate knowledge on the causes and prevention of disease in the population

M2: To promote health and health services

M3: To disseminate the knowledge on usage of cutting edge education and research tools of public health

C. Program Specific Outcome (PSO)

After five years of successful completion of the program, the student will be able to

PSO1	Prepare themselves to tackle public health crisis in holistic and sustainable way
PSO2	Integrate multi-disciplinary and trans disciplinary approach for preserving and improving the health of the community
PSO3	Develop Innovative Practices for public health issues
PSO4	Demonstrate quality in addressing public health crisis
PSO5	Develop themselves as competent human resources to deliver cutting edge , user friendly, point of care health technologies to society

D. PSO to Mission Statement Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5
M1	3	3	3	3	3
M2	3	3	3	3	2
M3	2	3	3	3	3

D. Graduate Attributes of MSc EPH Program

- 1) **Disciplinary knowledge:** This program will train the students to gain basic knowledge and skills in the discipline of EPH
- 2) **Communication Skills:** The students will be able to communicate efficiently the knowledge they acquired to the public
- 3) **Critical thinking:** The program will train them to think and analyse the problems critically
- 4) **Problem solving:** The students will be trained to come up with efficient solutions in research
- 5) **Research-related skills:** The program will impart basic and advanced laboratory training in the field of EPH
- 6) **Cooperation/Team work:** Thesis dissertation will help them understand the importance of team work in research
- 7) **Self-directed learning:** Curricula will train them to collect literature from various sources and interpret them
- 8) **Multicultural competence:** Community and field based research will expose the students to people belonging to various societal, cultural and geographical background
- 9) **Moral and ethical awareness/reasoning:** The ethics module in Research Methodology will impart the necessary training on research ethics
- 10) **Leadership readiness/qualities:** The program will provide the framework and opportunities to develop leadership qualities
- 11) **Societal and Environmental Concern:** Program will train the students on key aspects of Environmental and occupational health

E. Program Outcomes (PO)

On the successful completion of the program, the student will be able to

PO1	Apply qualitative and quantitative research methodology for health research
PO2	Demonstrate efficacy in collecting and collating health and disease data
PO3	Hands on experience on laboratory skills to define the distribution of diseases
PO4	Enhance health communication skills
PO5	Evaluate the health programme, policies in effective way

F. PO to PSO Mapping

	PO1	PO2	PO3	PO4	PO5
PSO1	3	3	3	3	3
PSO2	3	3	3	2	3
PSO3	3	3	3	1	3
PSO4	3	3	3	2	3
PSO5	3	3	3	2	3

Semester – I

SEMESTER - I					
Course Code	Course Name	L	T	P	Credits
EPH-S1-01	Principles and Practice of Public Health	2	1		3

a. Course Outcome (CO)

On the successful completion of the course, the student will be able to

	Course Outcome	Level
CO 1	To learn the principles of public health discipline	Understand
CO 2	To apply appropriate health behaviour models to understand health issues	Apply
CO 3	Examine the relevance of various institutions, approaches in public health promotion	Analyse
CO 4	Link public health practice and approaches to develop effective interventions	Create
CO 5	Develop skills and exposure to core public health competencies	Skill

Units	Content	Hrs.
I	Public Health Concepts and Goals Public health, Health its determinants, medicine vs public health, definition and history, Theoretical foundations and approaches of public health, Conceptual understanding of health, disease and medicine, Review of modern public health, Evidence based health policy, History of development of Indian Health service system, Health planning in India.	12
II	Health Care Delivery Models Introduction to health systems, Global burden of diseases and illness, Review of health systems around the world and Dimensions of comparative perspectives of health systems performance, MDGs, SDGs, Bilateral and Multilateral organizations and Best practices, Indian health service system- structure and functions, health care- levels, changing concepts, Primary health care as an approach to public health.	12
III	Health Promotion and Diseases Prevention Health behaviour and health education- concepts, principles and models, Communications and Public Health; Process and significance of health promotion, Investing in health promotion and disease prevention and Strategies and Evidences in health promotion and disease prevention,	12
IV	Core Competencies to Practice Public Health Public health preparedness-core concepts, Public Health Response- public, private, NGOS participation in health service delivery, Leadership in Public Health Practice, Public health surveillance, health impact assessment and Public health ethics and future challenges in public health. Conceptual framework of one health	12

	<p>Tasks and Assignments:</p> <p>Each student is required to submit the following:</p> <ul style="list-style-type: none"> ✓ Case study regarding the comparative health model of several countries ✓ Public health preparedness during disaster, outbreak, pandemic <p>References:</p> <ol style="list-style-type: none"> 1. Teutsch, S. M., & Churchill, R. E. (2000). Principles and practice of public health surveillance. Oxford University Press, USA. 2. Detels, R., McEwen, J., Beaglehole, R. and Tanaka, H. (2002). Oxford textbook of Public Health Ed, 4th Edition, Oxford University Press (OUP) 3. Beaglehole, R and Bonita, R. (2002). Public Health at the Crossroads – Achievements and Prospects. 2nd Edition Cambridge University Press 4. Suchman, E. (1968). Evaluative Research: Principles and Practice in Public Service and Social Action Progr. Russell Sage Foundation. 5. Schneider, M.J. (2016). Introduction to Public Health, 5th Ed. Jones & Bartlett Publishers, 6. Turnock, B.J. (2007). Essentials of Public Health -. Jones & Bartlett, 7. Park and Park (2015). Text book preventive and social medicine. 	
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c. Mapping of Program Outcomes with Course Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	2	2
CO2	3	2	3	3	3
CO3	3	3	3	3	3
CO4	2	2	1	3	2
CO5	1	2	3	1	2

d. Evaluation Scheme

	CO1	CO2	CO3	CO4	CO5	Total
Internal	10	10	5	5	10	40
External	12	12	12	12	12	60
Total	20	20	20	20	20	100

e. Mapping Course Outcome with Internal Assessment (40 Marks)

	CO1	CO2	CO3	CO4	CO5
Assignments	5	5	-	-	5
Test	5	5	5	5	5
Total	10	10	5	5	10

f. Mapping Course Outcome with External Assessment (60 Marks)

Category	CO1	CO2	CO3	CO4	CO5
Part – A (Objective - 10 x 1 = 10 marks)	2	2	2	2	2
Part – B (Long Answer - 5 x 10 = 50 marks)	10	10	10	10	10-
Total	12	12	12	12	12

g. Rubric for Assignments

Sl. No.	Criteria	100%	75%	50%	25%	0%	Relation to COs
1	Content 50%	Ideas are detailed, well developed, supported with specific evidence & facts and examples	Ideas are detailed, Developed and supported with evidence and facts mostly specific.	Ideas are presented but not particularly developed or supported.	Content is not sound	Not attended	CO1, CO2, CO5
2	Organization 50%	Includes title, introduction, statement of the main idea with illustration and conclusion.	Includes title, introduction, statement of main idea and conclusion.	organizational tools are weak or missing	No organization	Not attended	CO1, CO2, CO5

Sl. No.	Model Questions	Specification	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	Primary Health Care Approach was adopted by 134 countries inatConference A) 1978, Alma-Ata Conference B) 1968, Alma-Ata Conference B) 1978, Vienna Conference C) 1968, Vienna Conference	Recognize	Remember
2	Health is influenced by A) Biological Determinants B) External Physical Environmental Determinants C) Social Conditions D) All the Above	Recall	Remember
3	Infant mortality is the number of deaths perlive births of children underyear of age A) 100, 1 year B) 1000, 1year C) 10000, 2 year D) 100000, 1 year	Recognize	Remember

4	<p>Germ theory was proposed and developed by</p> <p>A) Virchow</p> <p>B) Winslow</p> <p>C) Robert Koch</p> <p>D) Vesalius</p>	Recognize	Remember
5	<p>Nationalisation of health insurance is the feature ofcountry's health care system.</p> <p>A) UK</p> <p>B) India</p> <p>C) Japan</p> <p>D) Pakistan</p>	Recognize	Remember
6	<p>..... are value-laden social judgements which possess a strong evaluative component</p> <p>A) Truths</p> <p>B) Attitudes</p> <p>C) Behaviour</p> <p>D) Knowledge</p>	Recognize	Remember
7	<p>The Health Belief Model was Proposed by</p> <p>A) Rogers</p> <p>B) Rosenstock and Becker</p> <p>C) Skinner and Adler</p> <p>D) Bandura and Skinner</p>	Recall	Remember
8	<p>Bandura proposedtheory to explain human behaviour</p> <p>A) The social learning theory</p> <p>B) The diffusion theory</p> <p>C) Becker</p> <p>D) Hadley</p>	Recall	Remember
9	<p>.....generally attempts to predict the future health consequences—both positive and negative impacts—of an</p>	Identify	Remember

	<p>intervention such as a policy, programme, or project</p> <p>A) Health Impact Assessment</p> <p>B) Health Policy</p> <p>C) Health Investigation</p> <p>D) Outbreak Investigation</p>		
10	<p>Public Health Preparedness aims at</p> <p>A) Mitigating the Problem</p> <p>B) Reducing the Impact</p> <p>C) Prepare for an Effective Response</p> <p>D) All the Above</p>	Identify	Remember
	<p style="text-align: center;">PART – B Long Answer</p> <p style="text-align: center;">The answer should not exceed 1500 words 10x 5 = 50</p>		
11	Discuss the role of public health principles in practice of the discipline	Explain	Understand
12	<p>a) Differentiate between health education and health behaviour</p> <p>b) Define best practices of public health.</p>	Differentiate Define	Understand
13	<p>a) Give two examples of best practices in community health interventions</p> <p>b) Give two examples of perceived susceptibility in health belief model</p>	Cite Examples	Understand
14	a) Apply health belief model and illustrate how it can be used to improve cancer control strategies	Illustrate	Apply
15	Discuss the health impact assessment and its relevance. Take a public health issue and using health impact assessment inputs explain how the problem can be tackled appropriately.	Assess	Skill

SEMESTER - I					
Course Code	Course Name	L	T	P	Credits
EPH-S1-02	Public Health Biology	2	2		4

a. Course Outcome (CO)

On the successful completion of the course, the student will be able to

	Course Outcome	Level
CO 1	To learn the fundamentals of basic biology	Understand
CO 2	To apply the biological knowledge for knowing health and disease	Apply
CO 3	Examine the role of biological path ways in diseases	Analyse
CO 4	Linking physiological, anatomical and molecular biology for health related events in human body	Create
CO 5	Asses the diseases and their patho biological path ways	Skill

b. Syllabus

Units	Content	Hrs.
I	Basic cell biology Chemical elements – Atoms, Molecules and Chemical bonds; Biomolecules – Carbohydrates, Lipids, Proteins and Nucleic acids; Overview of cell structure and function; Functions of proteins – Oxygen transport, Enzymes, Antibodies, Structural proteins, Signal proteins, Contractile Proteins, Transport across the cell membrane; Levels of organization	12
II	Basic Molecular Biology Chromosome, Gene, Gene Product, Allele, Genotype, Phenotype, DNA replication, Transcription, Translation, Regulation of gene expression, Signaling pathways that control gene activity, Homozygous, Heterozygous, Dominant, Co-dominance, Recessive, Sex-linked inheritance	12
III	Infectious agents Prokaryotes versus Eukaryotes; Bacteria as allies and pathogens; Fungi; Protozoa - Protozoans affecting humans; Viruses - DNA and RNA viruses; Prions - human and animal prion diseases	12
IV	Human Physiology Blood -Composition and function; Plasma protein - Composition and function; Cardiac cycle; Cardiac output; E.C.G; Blood pressure;	16

	Hypertension; Coronary artery disease; Respiratory physiology - Respiratory function tests; Renal physiology; Renal function tests; Acid Base balance; Gastrointestinal physiology - Mouth, Stomach, Small Intestine, Large Intestine Liver and Biliary system; Liver function test; Neuro-Endocrine and reproductive Physiology: Overview of organization of nervous system; Effects of pituitary, thyroid, parathyroid, adrenal, pancreatic and reproductive hormones; Physiology of menstruation and menopause, Physiology of pregnancy and lactation	
	<p>Tasks and Assignments:</p> <p>Each student is required to submit the following:</p> <ul style="list-style-type: none"> ✓ How do physiology, anatomy play a role in disease pathogenesis ✓ Role of gene, and infectious agents in natural history of diseases. <p>References:</p> <ol style="list-style-type: none"> 1. Guyton A.C. and Hall J.E. (2000). Textbook of Medical Physiology.10th ed. India: Harcourt Asia. 2. Tortora G.J and Grabowski S.R. (2000) Principles of Anatomy and Physiology.9th ed. John Wiley and Sons.Inc. 3. U. Satyanarayana . 2014. Biochemistry. 4th Ed. Elsevier Health Sciences 4. Nelson and Cox (2012). Lehninger Principles of Biochemistry W.H. Freeman; Sixth edition 5. Joanne Willey, Linda Sherwood Christopher J. Woolverton (2017) Prescott's Microbiology. Mc Graw Hill 13thed 6. NCERT Text Books of Biology 11TH and 12th Standard 7. K Sembulingam, Prem Sembulingam. Essentials of Medical Physiology, Seventh Edition 	

c. Mapping of Program Outcomes with Course Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	2	2	1	3	2
CO5	1	1	1	1	2

d. Evaluation Scheme

	CO1	CO2	CO3	CO4	CO5	Total
Internal	10	10	5	5	10	40
External	12	12	12	12	12	60
Total	20	20	20	20	20	100

e. Mapping Course Outcome with Internal Assessment (40 Marks)

	C01	C02	C03	C04	C05
Assignments	5	5	-	-	5
Test	5	5	5	5	5
Total	10	10	5	5	10

f. Mapping Course Outcome with External Assessment (60 Marks)

Category	C01	C02	C03	C04	C05
Part – A (Objective - 10 x 1 = 10 marks)	2	2	2	2	2
Part – B (Long Answer - 5 x 10 = 50 marks)	10	10	10	10	10-
Total	12	12	12	12	12

g. Rubric for Assignments

Sl. No.	Criteria	100%	75%	50%	25%	0%	Relation to COs
1	Content 50%	Ideas are detailed, well developed, supported with specific evidence & facts and examples	Ideas are detailed, Developed and supported with evidence and facts mostly specific.	Ideas are presented but not particularly developed or supported.	Content is not sound	Not attended	CO1, CO2, CO5
2	Organization 50%	Includes title, introduction, statement of the main idea with illustration and conclusion.	Includes title, introduction, statement of main idea and conclusion.	organizational tools are weak or missing	No organization	Not attended	CO1, CO2, CO5

i. Model Question Paper

Sl. No.	Model Questions	Specification	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	Two or more polypeptide chain associating to form a subunit of protein (A) Primary structure (B) Secondary structure (C) Tertiary (D) None of the above	Recognize	Remember
2	Insulin is (A) A receptor	Recall	Remember

	<p>(B) Hormone</p> <p>(C) Both of the above</p> <p>(D) None of the above</p>		
3	<p>ATP is expended in</p> <p>(A) Simple diffusion</p> <p>(B) Facilitated transport</p> <p>(C) Active transport</p> <p>(D) Both B and C</p>	Recognize	Remember
4	<p>Mycelium is a feature in</p> <p>(A) Protista</p> <p>(B) Prions</p> <p>(C) Fungi</p> <p>(D) <i>Cryptosporidium parvum</i></p>	Recognize	Remember
5	<p>Red tides are caused by</p> <p>(A) Protista</p> <p>(B) Dinoflagellates</p> <p>(C) Platyhelminths</p> <p>(D) Acanthocephalins</p>	Recognize	Remember
6	<p>Scrapie is a disease of</p> <p>(A) Cattle</p> <p>(B) Canines</p> <p>(C) Sheep</p> <p>(D) All of the above</p>	Recognize	Remember
7	<p>Triglycerides are</p> <p>(A) Three fatty acids attached to one glycerol</p> <p>(B) Three fatty acids attached to three glycerols</p> <p>(C) Three fatty acids</p> <p>(D) Three glycerols</p>	Recall	Remember
8	<p>The start codon is</p> <p>(A) AUG</p>	Recall	Remember

	(B) AGU (C) GUA (D) UGA		
9	Diverticular disease is related to (A) Respiratory system (B) Endocrine system (C) Digestive system (D) Nervous system	Identify	Remember
10	Ring stage malaria parasites is (A) An asexual stage (B) A sexual stage (C) Both of the above (D) None of the above	Identify	Remember
PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50			
1	Write short notes on A. Active transport B. Water is a polar molecule. Why? C. Bacteria as pathogens D. Classification of Bacteria	Explain	Understand
2	Write short notes on A. Prions B. Fungi C. Patterns of viral infections D. Function of proteins	Define	Understand
3	Give an overview of key organs and functions involved in digestive physiology, and highlight the major disease conditions that affect the digestive system	Cite Examples	Understand
4	Detail the different steps involved in the process of transcription in prokaryotes	Illustrate	Apply
5	Describe biomolecules in detail with adequate examples	Explain	Cite examples

SEMESTER - I					
Course Code	Course Name	L	T	P	Credits
EPH-S1-03	Foundations of Epidemiology	2	1	0	3

a. Course Outcome (CO)

On the successful completion of the course, the student will be able to

	Course Outcome	Level
CO 1	To learn the fundamentals of basic epidemiology	Understand
CO 2	To apply the epidemiological concept and terminologies for knowing health and disease	Apply
CO 3	Examine the role of several measurements used in epidemiology	Analyse
CO 4	Linking epidemiological concepts for health and diseases	Create
CO 5	Asses the several measurements, association in epidemiological survey, disease investigation, diagnostic tests evaluation	Skill

b. Syllabus

Units	Content	Hrs.
I	Introduction to Epidemiology Definition, Objective and uses and core functions of epidemiology, Epidemiologic approach, Historical evolution of epidemiology, Concept of health and disease, Determinants of health and diseases, Difference between epidemiology and clinical/preventive medicine, Epidemiology as the cornerstone of public health/health - for example: contribution of Nurses' Health study, British Doctors' study and Framingham Heart Study to public health etc.	12
II	Basic concepts of epidemiology Difference between infectious and communicable diseases vs. non-communicable diseases, Natural history of disease, Chain of infection, Mode and route of transmission of diseases, Meaning of outbreak or epidemic, endemic and pandemic, incubation period, latency period, clinical case, subclinical case, carrier, infectivity, pathogenicity and virulence, theories and principles of causation- epidemiological triad, web of causation, Bradford Hill criteria and Rothman's Causal pies, levels of prevention and modes of intervention.	12
III	Concept of several measurements used in epidemiology Basic quantitative measures: Rates, Ratios and Proportions, Logarithms, Odds and Probability. Measures of morbidity: Prevalence, Incidence proportion (Attack rate), Incidence rate (person-time), Relationship between incidence and prevalence. Measures of Mortality: Mortality rates, Crude death rate, Specific death rates, Case fatality rate, Infant and	12

	<p>child mortality rates, proportional mortality rate, survival rate, calculation of adjusted and standardized prevalence and death rates, concept of DALYs. Measures of association – Absolute risk, Relative risk, prevalence ratios, odds ratio, Measures of impact – Attributable risk, Population-attributable risk with real data examples.</p>	
<p>IV</p>	<p>Overview of epidemiological study</p> <p>Classification of epidemiological studies, design, advantages and disadvantages of descriptive study according to time, place and person, (Case study, Case series, and Ecological study), epidemic curve, concept of analytical and experimental study, Concepts of clinical epidemiology: Surveillance and Screening: Definition, functions, various forms of public health surveillance, surveillance system design and operation, understanding of Integrated Disease Surveillance Programme (IDSP), Definition, basis of screening, lead time, types and uses of screening, criteria for choosing a screening test, screening tests vs. diagnostic tests, error in screening tests, validity, sensitivity, specificity, accuracy, predictive values, likelihood ratio, reliability, kappa statistics, ROC curves, evaluation of screening tests, multiphasic screening tests.</p>	<p>16</p>
	<p>Tasks and Assignments:</p> <p>Each student is required to submit the following:</p> <ul style="list-style-type: none"> ✓ .Case study regarding the usage of basic epidemiological measures ✓ .Preparing the disease investigation methodology <p>References:</p> <ol style="list-style-type: none"> 1. Lilienfeld, D. E., & Stolley, P. D. (1994). Foundations of epidemiology. Oxford University Press, USA. 2. Gordis L. (2014). Epidemiology, 5th Edition. WB Sanders Co, Philadelphia 3. Merrill, R. M. (2015). Introduction to epidemiology. Jones & Bartlett Publishers. 4. Park, K (2017) Parks Text Book Of Preventive & Social Medicine, BanarsidasBhanot Publishers 5. Pearce, Neil. (2005) A short Introduction Epidemiology. Centre for Public Health Research, Massey University, Wellington, New Zealand, pp. 130 ISBN: 0-473-09560-2 6. Dworkin, S. F., Huggins, K. H., LeResche, L., Von Korff, M., Howard, J., Truelove, E., & Sommers, E. (1990). Epidemiology of signs and symptoms in temporomandibular disorders: clinical signs in cases and controls. <i>The Journal of the American Dental Association</i>, 120(3), 273-281. 7. Bhopal, R. S. (2007). <i>Ethnicity, race, and health in multicultural societies: foundations for better epidemiology, public health, and health care</i>. Oxford University Press. 	

1	Content 50%	Ideas are detailed, well developed, supported with specific evidence & facts and examples	Ideas are detailed, Developed and supported with evidence and facts mostly specific.	Ideas are presented but not particularly developed or supported.	Content is not sound	Not attended	CO1, CO2, CO5
2	Organization 50%	Includes title, introduction, statement of the main idea with illustration and conclusion.	Includes title, introduction, statement of main idea and conclusion.	organizational tools are weak or missing	No organization	Not attended	CO1, CO2, CO5

i. Model Question Paper

Sl. No.	Model Questions	Specification	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	Which of the following is a type of diagnostic survey (A) Screening (B) Surveillance (C) Monitoring (D) None	Recognize	Remember
2	Incidence rate denotes (A) Old and new cases (B) Only new cases (C) Only old cases (D) All of the above	Recognize	Remember
3	Descriptive epidemiology is related to: (A) Time (B) Place (C) Person (D) All	Recognize	Remember
4	Analytical epidemiology is related to: (A) Case control studies (B) Cohort studies (C) Both (D) Clinical studies	Recognize	Remember
5	Epidemic is known as (A) Most frequently occurred disease (B) Excess occurrence of disease (C) Diseases covering continents (D) None	Recall	Remember
6	Odds ratio can be calculated in (A) Cohort study (B) Case control studies (C) Cross sectional studies (D) RCT	Recognize	Remember

7	Cholera is an example of (A) Point source epidemic (B) Propagated epidemic (C) Continuous exposure point source epidemic (D) None	Recognize	Remember
8	Attack rate is denoted as (A) Incidence rate (B) Prevalence rate (C) Ratio (D) CFR	Recognize	Remember
9	Herd immunity is defined as: (A) 70% individual immune to disease (B) 20% individual immune to disease (C) Only 2% individual immune to disease (D) None	Identify	Remember
10	Prevalence is defined as (A) $P = I \times E$ (B) $P = I \times S$ (C) $P = I \times R$ (D) $P = I \times D$	Identify	Remember
	PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50		
1	Differentiate and explain the following: Preventive Medicine vs Public Health ; B) MDGs vs SDGs C) Acute vs Chronic disease ; D) Epidemic vs Pandemic E) RCTs	Differentiate Define	Understand
2	Describe Health? Elucidate about concept of Health.	Explain	Understand
3	What is epidemiology? Discuss about the epidemiological study designs	Cite Examples	Understand
4	What is natural history of disease? Explain in detail about the Iceberg concept of disease	Explain	Apply
5	What is epidemiological triad? Explain in detail about the epidemiology of tuberculosis using the epidemiological triad	Explain	Apply

SEMESTER - I					
Course Code	Course Name	L	T	P	Credits
EPH-S1-04	Environmental and Occupational Health	2	1	0	3

a. Course Outcome (CO)

On the successful completion of the course, the student will be able to

	Course Outcome	Level
CO 1	To make the students understand the foundations of environmental health	Understand
CO 2	To apply the knowledge of environmental science in health and disease	Apply
CO 3	Examine the impact of micro environment, macro environment on health of community	Analyse
CO 4	Linking environmental factors and others xenobiotic for health and diseases	Create
CO 5	Develop the skill on environmental remediation	Skill

b. Syllabus

Units	Content	Hrs.
I	Foundations of Environmental Health Environment, Concept, Environment In Action, Types, Components, Environmental Health, Environmental Health Science, Ecosystems, Effects of The Environment on Health, Major Current Environmental Health Problems, Environmental Issues in Global, Scope Of Environmental Health.	12
II	Environmental Factors and Human Health Environmental Contributors, Environmental factors that can affect health, Hygiene, Sanitation, components of hygiene and Environmental health, Environmental health and disease transmission, Healthy Environment, Environmental Nutrition, Food and Environment Relation, Diet and Environment Relation, Emerging issues in environmental health- Slums, Global Warming , Disaster management and risk assessment, Common health problems among refugees and migrants	12
III	Occupational Health and Environmental Problems	12

	Occupational health and Safety, Definition, Concept, Types of Occupational Health Hazards, Determinants Of Health, Occupational Health And Service Infrastructure Relevance, Environment (E), Health (H) And Safety, Health And Safety Of Workers, Role Of Environmental Health In Public Health- Physical Environmental Factors, Social Environmental Factors, Chemical Environmental Factors, Electrical Hazards, Heat, Noise, Inadequate Ventilation, Laser Smoke, Radiation, Non-Ionizing Radiation, Pollution And Pollutant, Environmental Problems, Water Pollution, Water Contaminants, Waste Disposal, Water And Health, Ground Water Contamination, Groundwater Remediation, Disposal Of Industrial Effluents, Air Pollution, Global Air Pollution Issues, Housing Affecting Health, Hospital Waste Management, Health Effects Of Air Pollutants, Solid Wastes, Environmental Health Problems Through Food, Environmental Health Problems Through Soil	
IV	<p>Fundamentals of Pollution Prevention and Toxicology</p> <p>Environmental factors that can affect health, Environmental toxins, How our bodies handle toxins, Pollution Prevention, Pollution Prevention Leads to Environmental Sustainability, Toxicology, scope of toxicology, goal of toxicity assessment, Principles of Toxicology, Toxicological Paradigm, Toxicokinetics, Toxicodynamics, Molecular Targets Concept, Dose-Response-Concept, Regulatory Toxicology and Risk Assessment, Toxicological Risk Assessment, Disposal of Xenobiotics.</p>	12
	<p>Tasks and Assignments:</p> <p>Each student is required to submit the following:</p> <ul style="list-style-type: none"> ✓ Case study regarding the health hazards and environmental pollution ✓ Critically analyse and prepare the reports on the environmental remediation plan and policies <p>References:</p> <ol style="list-style-type: none"> 1) Wisner B., Adams J. (2002). A Practical Guide: Environmental health in emergencies and disasters. World Health Organization. 2) Dade W. Moeller (2005). Environmental Health, Cambridge, MA:Harvard University Press. 3) Barry, S. L., David H. W., Sherry, L. B. and Rosemary K. S. (2011). Occupational and Environmental Health. 7th ed. Oxford University Press. Philadelphia: Lippincott Williams & Wilkins. 4) Burcham Philip C. (2014). An Introduction to Toxicology. Springer London. 5) Hodgson Ernest (2004). A Textbook of Modern Toxicology, Third Edition, A John Wiley & Sons, Inc., Publication. 6) Jaiswal, A. (2011). Anthro-Medical Profile of textile workers. Alfa Publications, New Delhi 7) Byung-Mu Lee, Sam Kacew. (2012). Lu's Basic Toxicology: Fundamentals, Target Organs, and Risk Assessment, 6th ed. CRC Press, ISBN 9781841849546 8) Hallenbeck, W. H. (1993). Quantitative risk assessment for environmental and occupationalhealth. CRC Press. 9) Mackay, D., &Boethling, R. S. (Eds.). (2000). Handbook of 	

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c. Mapping of Program Outcomes with Course Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	2	2	1	3	2
CO5	1	1	1	1	2

d. Evaluation Scheme

	CO1	CO2	CO3	CO4	CO5	Total
Internal	10	10	5	5	10	40
External	12	12	12	12	12	60
Total	20	20	20	20	20	100

e. Mapping Course Outcome with Internal Assessment (40 Marks)

	CO1	CO2	CO3	CO4	CO5
Assignments	5	5	-	-	5

Test	5	5	5	5	5
Total	10	10	5	5	10

f. Mapping Course Outcome with External Assessment (60 Marks)

Category	CO1	CO2	CO3	CO4	CO5
Part – A (Objective - 10 x 1 = 10 marks)	2	2	2	2	2
Part – B (Long Answer - 5 x 10 = 50 marks)	10	10	10	10	10-
Total	12	12	12	12	12

g. Rubric for Assignments

Sl. No.	Criteria	100%	75%	50%	25%	0%	Relation to COs
1	Content 50%	Ideas are detailed, well developed, supported with specific evidence & facts and examples	Ideas are detailed, Developed and supported with evidence and facts mostly specific.	Ideas are presented but not particularly developed or supported.	Content is not sound	Not attended	CO1, CO2, CO5
2	Organization 50%	Includes title, introduction, statement of the main idea with illustration and conclusion.	Includes title, introduction, statement of main idea and conclusion.	organizational tools are weak or missing	No organization	Not attended	CO1, CO2, CO5

i. Model Question Paper

Sl. No.	Model Questions	Specification	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	Eutrophied lakes can be riched in (A) algal bloom (B) Sediments (C) Gobar gas (D) None	Recognize	Remember
2	PAN is an example of (A) Secondary pollutant (B) Primary pollutant (C) Mixed pollutant (D) All	Recall	Remember
3	Acid rain can be caused at the level of ----- P^H (A) 6.7 (B) 8.1 (C) 4.5 (D) 7	Recognize	Remember

4	Carbon toxicity can cause which of the following condition (A) Byssinosis (B) Bagassiosis (C) Asbestosis (D) Anthracosis	Recognize	Remember
5	Which of the following is an aerosol transmitted bacterial disease (A) TB (B) Dengue (C) Rabies (D) Flu	Recognize	Remember
6	Cadmium poison caused which of the following disease (s) (A) Niligata (B) Minimata (C) Itai-itai (D) Sungri	Recognize	Remember
7	MIC is responsible for: (A) Chernobyl disaster (B) Fukushima disaster (C) Bhopal gas disaster (D) All	Recall	Remember
8	Dental line is formed due to----- poisoning (A) Hg poisoning (B) Pb poisoning (C) Cd poisoning (D) As poisoning	Recall	Remember
9	Plague outbreak can easily occur after which of the following disasters (A) Flood (B) Forest fire (C) Earthquake (D) None	Identify	Remember
10	Which of the following is a manmade disaster? (A) Earthquake (B) Rain (C) Radioisotopes (D) Flood	Identify	Remember
	PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50		
1	Differentiate and explain the following: A) Tropical forest vs Temperate forest ; B) Aerosol vs Droplet ; C) Arsenic poison vs Mercury poison ; D) Carrier vs reservoir ; E) Bysiniosis vs Anthracosis	Differentiate Define	Understand
2	What is occupational health? What is factory act? What is ESIC? What is HACCP?	Explain	Understand

3	Explain cyanide toxicity? Write down the principles of managing the poisoned patient.	Explain	Apply
4	What is Toxicology? Write in detail about heavy metal toxicity	Explain	Understand
5	What is sanitation? Write in brief about all the emerging diseases related to climate change.	Explain	Apply

EPH-S1-05 Biostatistics for Public Health

SEMESTER - I					
Course Code	Course Name	L	T	P	Credits
EPH-S1-05	Biostatistics for Public Health	1	2		3

a. Course Outcome (CO)

On the successful completion of the course, the student will be able to

	Course Outcome	Level
CO 1	To learn the fundamentals of biostatistics and data presentation	Understand
CO 2	To apply the knowledge of hypothesis testing	Apply
CO 3	Analyse data sets using different statistical tests	Analyse
CO 4	Linking hypothesis testing to statistical significance	Create
CO 5	Develop skills to understand and present their research data, select the right statistical approach for their research question.	Skill

b. Syllabus

Units	Content	Hrs.
I	Introduction to statistics, data presentation Introduction to statistics: definition, meaning and significance of statistics, Role of statistics in biological and health sciences, limitations and misuse of statistics. Types of data: Levels of measurement-categorical (nominal, ordinal), numerical (Discrete and continuous), Meaning of univariate, bivariate and multivariate data. Data presentation: Frequency distribution, relative and cumulative frequency distribution. Construction of bar chart, pie chart, histograms, frequency polygon, box-plot, and line charts.	12
II	Descriptive statistics, Skewness and Kurtosis Arithmetic Mean, Median, Mode and Weighted mean, Quartile, Percentile, Range, Inter-quartile range, Mean deviation, Variance and standard deviation, Coefficient of variation, Skewness, kurtosis and moments, meaning of a parameter and a statistic.	12
III	Probability Distributions Population, sample, event, sample space, definition of probability, addition & multiplication laws of probability, independence, conditional probability, Bayes' theorem and its applications. Probability distributions: Binomial distribution, Poisson distribution, Normal distribution and applications of standard normal distribution. Sampling distribution, Standard Error of Mean and Central limit theorem. Probability and Non-probability sampling (Basics)	12

<p>IV</p>	<p>Hypothesis testing and Tests of statistical significance, Correlation and Regression</p> <p>Hypothesis testing: steps in hypothesis testing, null and alternate hypothesis, test-statistic, level of significance, P-value, type 1 and type 2 errors, degrees of freedom, meaning of statistical and clinical significance. Confidence intervals, power and sample size estimation. Types of statistical tests: Parametric test – Z-test, one-sample t test, Paired student’s t test, unpaired student’s t test, one-way and two-way ANOVA. Non Parametric tests – Sign test, Chi-square test, Wilcoxon test, Mann-Whitney test.</p> <p>Correlation: definition, types of correlation, scatter plot Pearson product moment correlation coefficient, interpretation of and r^2, Spearman’s rank correlation coefficient, Regression: definition, concepts of regression, regression line, least squares regression equation, regression coefficients, predicted values, residual plots, multiple linear regression and logistic regression</p>	<p>12</p>
	<p>Tasks and Assignments:</p> <p>Each student is required to submit the following:</p> <ul style="list-style-type: none"> ✓ Data analysis report ✓ Assignment on central tendencies <p>References:</p> <ol style="list-style-type: none"> 1. Goon A.M., Gupta M. K., Dasgupta B (2008): Fundamentals of Statistics, Published by Prentice Hall, 2nd edition. 2. Gupta S.C.& Kapoor V.K, (2000): Fundamentals of & Mathematical Statistics, Sultan Chand Sons 10th edition. 3. Croxton F.E., Cowden D.J. & Kelin S, (1967): Applied General Statistics, Prentice Hall. 4. Hogg and Craig, Introduction to Mathematical Statistics, (2013): Prentice Hall, 7th edition. 5. Steel and J H Torrie, Principles and procedures of statistics, (2007): McGraw Hill, 2nd edition. 6. Last, J. M., Abramson, J. H., & Freidman, G. D. (Eds.). (2001). <i>A dictionary of epidemiology</i>(Vol. 141). New York: Oxford University Press. 7. Sullivan, L. M. (2011). <i>Essentials of biostatistics in public health</i>. Jones & Bartlett Publishers. 8. Lawson, A. B., & Kleinman, K. (Eds.). (2005). Spatial and syndromic surveillance for public health. 9. Kirch, W. (2008). <i>Encyclopedia of Public Health. 2 Vol</i> (Vol. 1). Springer Science & Business Media. 9. Motulsky H, (1995) .Intuitive Biostatistics, Oxford University Press. 10. Douglas G. Altman, Chapman & Hall. (1991). Practical Statistics for Medical Research. 11. Marcello Pagano and Kimberlee Gauvreau. (2018). Principles of Biostatistics. CRC Press, Taylor and Francis group. 12. Dr P. Mariappan. (2013). Biostatistics an Introduction. Pearson 13. Marc Triola, Mario F. Triola and Jason Roy. (2018). Biostatistics for the biological and health sciences. Pearson. 	

c. Mapping of Program Outcomes with Course Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	2
CO2	3	3	3	2	2
CO3	3	3	3	2	2
CO4	2	2	3	2	2
CO5	3	3	3	1	2

d. Evaluation Scheme

	CO1	CO2	CO3	CO4	CO5	Total
Internal	10	10	5	5	10	40
External	12	12	12	12	12	60
Total	20	20	20	20	20	100

e. Mapping Course Outcome with Internal Assessment (40 Marks)

	CO1	CO2	CO3	CO4	CO5
Assignments	5	5	-	-	5
Test	5	5	5	5	5
Total	10	10	5	5	10

f. Mapping Course Outcome with External Assessment (60 Marks)

Category	CO1	CO2	CO3	CO4	CO5
Part – A (Objective - 10 x 1 = 10 marks)	2	2	2	2	2
Part – B (Short Answer - 5 x 10 = 50 marks)	10	10	10	10	10-
Total	12	12	12	12	12

g. Rubric for Assignments

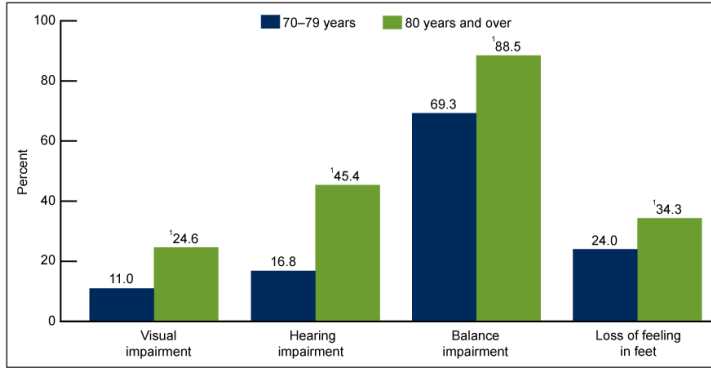
Sl. No.	Criteria	100%	75%	50%	25%	0%	Relation to COs
1	Content 50%	Detailed data tabulation with correct graphical representation, use of appropriate statistical tests and statistical interpretation of the results	Data tabulation with less details, use of appropriate statistical test without interpretation	Data tabulation without graphical representation, inappropriate statistical tests	Content is not sound	Not attended	CO1, CO4, CO5
2	Organization 50%	Includes title, introduction, tables and graphs with proper labels and values, univariate, bivariate and	Includes title, introduction, tables and graphs with no proper labels and values,	Lack of organization in statistical steps of univariate, bivariate and multivariate	No organization	Not attended	CO1, CO2, CO5

		multivariate analysis properly organized	univariate, bivariate and multivariate analysis not properly organized.	analysis			
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i. Model Question Paper

Sl. No.	Model Questions	Specification	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	The type of variables like Religion, Blood Group, Type of mosquito etc. is..... a) Categorical –Ordinal b) Continuous c) Numerical discrete d) Categorical-Nominal	Recognize	Remember
2	Which of the following is the best for measuring central tendency for continuous variable with symmetric distribution? a) Mean b) Median c) Mode d) All of the above	Recall	Remember
3	Answer whether the following statements are True or False “It is possible to have several frequency distributions of a variable with same mean, but different variance” a) True b) False	Recognize	Remember
4	In a symmetric distribution a) mean>median>mode b) mean<median<mode c) mean>mode>median d) mean<mode<median	Recognize	Remember
5	Find the 50th percentile value for the below data set "12,16, 17,21, 23, 25, 29,31, 32, 35" a)24 b)21 c)31 d)25	Analyse	Apply
6	From the bar chart, what is the most prevalent sensory impairment among 80 years and over people in USA between 1999-2006?	Analyse	Apply

Figure 3. The prevalence of sensory impairments among persons aged 70–79 years compared with persons aged 80 years and over: United States, 1999–2006



*Significantly different from the 70–79 age group.
SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey.

- a) Balance Impairment
- b) Visual Impairment
- c) Hearing Impairment
- d) Loss of feeling in the feet

	<p>Figure 3. The prevalence of sensory impairments among persons aged 70–79 years compared with persons aged 80 years and over: United States, 1999–2006</p> <p>*Significantly different from the 70–79 age group. SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey.</p> <ul style="list-style-type: none"> a) Balance Impairment b) Visual Impairment c) Hearing Impairment d) Loss of feeling in the feet 		
7	<p>Which of the statements about p value is/are wrong</p> <ul style="list-style-type: none"> a) It is the probability of obtaining a sample mean, given that the value stated in the null hypothesis is true. b) It varies between -1 and 1 c) We compare the p value to the criterion we set in Step 2 d) The p value for obtaining a sample outcome is compared to the level of significance. 	Recall	Remember
8	<p>55 pregnant mothers were given iron supplements for 4 months. Their blood haemoglobin level was measured before and after the program. What type of statistical tests (parametric and non-parametric) will you use to check the effectiveness of the program?</p> <ul style="list-style-type: none"> a) Paired t test b) Wilcoxon Signed Rank test c) Mann whitney test d) z test 	Recall	Remember
9	<p>Pearson’s correlation coefficient value for no correlation is.....</p> <ul style="list-style-type: none"> a) 1 b) 2 c) -1 d) 0 	Identify	Remember
10	<p>If type II error or β error for a statistical test is 0.20. What is the power of the test?</p> <ul style="list-style-type: none"> a) 0.20 b) 0.05 c) 0.80 d) 0.90 	Analyze	Apply
	<p style="text-align: center;">PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50</p>		
1	<ul style="list-style-type: none"> a) What are the different types of data? Give examples. b) List and explain at least FIVE types of data presentation. 	Explain, differentiate	Understand

2	a) Define “population” and “sample”. Why do we need sampling and what are the different types of sampling techniques used in epidemiological studies?	Differentiate Define	Understand
3	What are the steps involved in deciding appropriate statistical method for research? List the statistical assumptions for parametric tests.	Illustrate	Understand
4	<p>Explain the steps involved in a hypothesis testing using the following example.</p> <p>“A study reported that the population mean score in National Eligibility Test (NET) in India between the year 2000 and 2020 was 558 with a standard deviation of 139. Suppose we select a sample of 100 participants ($n = 100$). We record a sample mean equal to 575. Compute the z test for whether or not we will retain the null hypothesis at a 0.05 level of significance.”</p> <p>Note: Give each step using the example</p>	Apply	Skill
5	<p>Suppose a random variable X has a Binomial Distribution B (20, 0.20)</p> <p>a) Find the expected value (mean) of this distribution? b) Find the Standard Deviation of this distribution? c) Find the probability that $X = 10$ d) Find the probability that $X \leq 5$</p>	Apply	Skill

SEMESTER - I					
Course Code	Course Name	L	T	P	Credits
EPH-S1-P1	Basic Laboratory Techniques in Epidemiology and Public Health Research			2	2

a. Course Outcome (CO)

On the successful completion of the course, the student will be able to

	Course Outcome	Level
CO 1	To learn the fundamentals basic laboratory techniques	Understand
CO 2	To apply understanding of bacteriological techniques for delineating disease causing pathogen	Apply
CO 3	Examine the role of several physiological and biochemical parameters in health and disease	Analyse
CO 4	Preparation of disease specific model for delineating the role of pathogens , attributes of the human physiology and biochemical parameters in natural history of diseases	Create
CO 5	Hand on experience on basic bacteriology, physiology and biochemistry	Skill

b. Syllabus

Units	Content	Hrs.
I	Overview and maintenance of epidemiological laboratory Overview of epidemiological laboratory, Collection, transportation and preservation of biological material Sterilization techniques Preparation of media	12
II	Basic microbiological techniques Bacterial staining techniques, Isolation of bacteria from soil, water, and food, Bacterial culture techniques, Measurement of bacterial viable cell numbers, Determination of most probable number of coliforms, Antibiotic Sensitivity Test	12
III	Basic lab techniques in human physiology and biochemistry Analysis and interpretation of blood and urine parameters, Measurement and recording of blood pressure, ECG, Temperature, pulse rate etc	12
IV	Fundamentals of molecular biology techniques Extraction of DNA and RNA, DNA and protein measurement, Gel electrophoresis	12
	Tasks and Assignments:	

	<p>Each student is required to submit the following:</p> <ul style="list-style-type: none"> ✓ Case study regarding the usage of microbiology, physiology and biochemistry for the health of the community ✓ Laboratory preparedness for investigation of the diseases <p>References:</p> <ol style="list-style-type: none"> 1. Cappucino J and Sherman N. (2010). Microbiology: A Laboratory Manual. 9th edition. Pearson Education Limited 2. Willey MJ, Sherwood, LM & Woolverton C J (2013). Prescott, Harley and Klein's Microbiology by. 9th Ed., McGrawHill 3. Watson JD, Baker TA, Bell SP, Gann A, Levine M and Losick R (2008) Molecular Biology of the Gene, 6th edition, Cold Spring Harbour Lab. Press, Pearson Publication 4. De Robertis EDP and De Robertis EMF (2006) Cell and Molecular Biology, 8th edition. Lippincott Williams and Wilkins, Philadelphia 5. Karp G (2010) Cell and Molecular Biology: Concepts and Experiments, 6th edition, John Wiley & Sons. Inc. 6. Sambrook J and Russell DW. (2001). Molecular Cloning: A Laboratory Manual. 4th Edition, Cold Spring Harbour Laboratory press. 7. Krebs J, Goldstein E, Kilpatrick S (2013). Lewin's Essential Genes, 3rd Ed., Jones and Bartlett Learning 	
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c. Mapping of Program Outcomes with Course Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	2	2	1	3	2
CO5	1	1	1	1	2

d. Evaluation Scheme

	CO1	CO2	CO3	CO4	CO5	Total
Internal	10	10	5	5	10	40
External	12	12	12	12	12	60
Total	22	22	17	17	22	100

e. Mapping Course Outcome with Internal Assessment (40 Marks)

	CO1	CO2	CO3	CO4	CO5
Assignments	5	5	-	-	5
Practical test	5	5	5	5	5
Total	10	10	5	5	10

f. Mapping Course Outcome with External Assessment (60 Marks)

Category	CO1	CO2	CO3	CO4	CO5
Part – A (viva voce/records- 10 Marks)	2	2	2	2	2
Part – B Experiments and Answer the Questions (5X10)	10	10	10	10	10-
Total	12	12	12	12	12

g. Rubric for Assignments

Sl. No.	Criteria	100%	75%	50%	25%	0%	Relation to COs
1	Content 50%	Ideas are detailed, well developed, supported with specific evidence & facts and examples	Ideas are detailed, Developed and supported with evidence and facts mostly specific.	Ideas are presented but not particularly developed or supported.	Content is not sound	Not attended	CO1, CO2, CO5
2	Organization 50%	Includes title, introduction, statement of the main idea with illustration and conclusion.	Includes title, introduction, statement of main idea and conclusion.	organizational tools are weak or missing	No organization	Not attended	CO1, CO2, CO5

i. Model Question Paper

Sl. No	PART – B Experiments and Question answers 10x 5 = 50		
	Methods of Bacterial isolation(Gram positive/ Gram negative)	Understand	Explain
	Methods of cell culture	Understand	Skill
	Methods of DNA isolation and estimation	Understand	Apply
	Methods of estimation urine/blood parameters for Diabetes	Asses	Skill
	Methods of estimating blood parameters Cardiovascular diseases.	Assess	Skill

SEMESTER - I					
Course Code	Course Name	L	T	P	Credits
EPH-S1-E1	Fundamental of Human Genetics	2	1	0	3

a. Course Outcome (CO)

On the successful completion of the course, the student will be able to

	Course Outcome	Level
CO 1	To learn the fundamentals human genetics	Understand
CO 2	To apply several genetic measurement tools for understanding inheritance and health of the people	Apply
CO 3	Examine the role of several genetic markers in health and diseases	Analyse
CO 4	Linking genotypes, environment and phenotypic attributes for several health disorders and anomalies	Create
CO 5	Learn the technique of blood grouping , epigenetics and health of the community	Skill

b. Syllabus

Units	Content	Hrs.
I	Introduction to Human Genetics History; Early perception, development and documentation; Human Genome organization; Chromosome structure, function and implications for disease. Ethical, legal and social issues in Human genetics: Prenatal/adult (individual/family/population) screening of mutation/risk factor for genetic diseases; Confidentiality/privacy, Discrimination, Research ethics; Medical ethics in India for genetics and breeding, Ethical dilemma, Human rights, Human cloning and eugenics; Organ banking and transplantation.	12
II	Study tools in Human Genetics Pedigree analysis- Mendelian inheritance and exceptions; Chromosomal analysis (in vitro, in vivo), Biochemical analysis; Somatic cell genetics (somatic cell hybrids, monochromosome hybrid panels, gene mapping); Molecular genetic analysis.	12
III	Genetic variation in health and disease Human genetic diversity- Methods of study – Biochemical/molecular genetic markers; some examples. Tracing human migrations with autosomal, Y-chromosomal and mitochondrial markers.	12
IV	Diseases and disorders	16

	<p>Chromosomal disorders: Structural and numerical; Autosomal/sex chromosomal/sex reversal; Mechanisms – mitotic/meiotic non-disjunction/ chromosomal rearrangements; some examples (Syndromes/Cancer/Infertility); Single gene and disease: Inborn errors of metabolism, Haemoglobinopathies; Multifactorial disorders: Introduction; Methods of study (Epidemiological, Twin/ adoption and Family studies); Etiology - genetic and non-genetic determinants; Common examples. Epigenetics and disease: Mechanisms (Imprinting/methylation; chromatin remodelling); Current understanding; examples. Mitochondrial myopathies. Blood grouping and Blood disorders. Prevention and control of genetic disorder and genetic counselling</p>	
	<p>Tasks and Assignments:</p> <p>Each student is required to submit the following:</p> <ul style="list-style-type: none"> ✓ Case study regarding the role of gene for the status of health ✓ Laboratory preparedness for genetically controlled diseases/disorders <p>References:</p> <ol style="list-style-type: none"> 1. Human Genetics: Problems and Approaches, T Vogel F. and Motulsky A. GT Springer Verlag 2. Human Molecular Genetics, Strachan T & Read A. Garland Science 3. An Introduction to Human Molecular Genetics: Mechanism of Inherited Diseases, Pasternak J Fitzgerald Science Press 4. The AGT Cytogenetics Lab Manual, B Arch, Knutsen and Spurbeck, Lippincott Raven publication 	

c. Mapping of Program Outcomes with Course Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	2	2	1	3	2
CO5	1	1	1	1	2

d. Evaluation Scheme

	CO1	CO2	CO3	CO4	CO5	Total
Internal	10	10	5	5	10	40
External	12	12	12	12	12	60
Total	22	22	17	17	22	100

e. Mapping Course Outcome with Internal Assessment (40 Marks)

	CO1	CO2	CO3	CO4	CO5
Assignments	5	5	-	-	5
Practical test	5	5	5	5	5
Total	10	10	5	5	10

f. Mapping Course Outcome with External Assessment (60 Marks)

Category	CO1	CO2	CO3	CO4	CO5
Part – A (Objective - 10 x 1 = 10 marks)	2	2	2	2	2
Part – B Answer the Questions (5X10)	10	10	10	10	10-
Total	12	12	12	12	12

g. Rubric for Assignments

Sl. No.	Criteria	100%	75%	50%	25%	0%	Relation to COs
1	Content 50%	Ideas are detailed, well developed, supported with specific evidence & facts and examples	Ideas are detailed, Developed and supported with evidence and facts mostly specific.	Ideas are presented but not particularly developed or supported.	Content is not sound	Not attended	CO1, CO2, CO5
2	Organization 50%	Includes title, introduction, statement of the main idea with illustration and conclusion.	Includes title, introduction, statement of main idea and conclusion.	organizational tools are weak or missing	No organization	Not attended	CO1, CO2, CO5

i. Model Question Paper

Sl. No.	Model Questions	Specification	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	The genotypes of a husband and wife are $I^A I^B$ and $I^A I^O$, respectively. Among the blood types of their children, how many different genotypes and phenotypes are possible? A) 3 genotypes; 4 phenotypes B) 4 genotypes; 3 phenotypes C) 4 genotypes; 4 phenotypes D) 3 genotypes; 3 phenotypes	Recognize	Remember
2	Which of the following statements is true regarding the “law of segregation”? A) The Law of segregation is the law of purity of genes B) Alleles separate from each other during gametogenesis C) Segregation of factors is due to the segregation of chromosomes during meiosis D) All of the above	Recall	Remember
3	The percentage of the human genome which encodes proteins is approximately A) Less than 2%	Recognize	Remember

	<p>B) 10%</p> <p>C) 25%</p> <p>D) 99%</p>		
4	<p>In a marriage between a male with blood group A and a female with blood group B, the progeny had either blood group AB or B. What could be the possible genotype of parents?</p> <p>A) $I^A I^0$ (male); $I^B I^B$ (female)</p> <p>B) $I^A I^A$ (male); $I^B I^B$ (female)</p> <p>C) $I^A I^A$ (male); $I^B I^0$ (female)</p> <p>D) $I^A I^0$ (male); $I^B I^0$ (female)</p>	Recognize	Remember
5	<p>If <i>Drosophila</i> males of genotype AaBb are crossed with a female of genotype AABB. What is the percentage of white-eyed wrinkle-winged offspring in the first generation (A-red eye, a-white eye, B-smooth wings, b-wrinkled wings)?</p> <p>A) 0%</p> <p>B) 10%</p> <p>C) 20%</p> <p>D) 25%</p>	Recognize	Remember
6	<p>The hereditary disease in which the urine of a person turns black on exposure to the presence of homogentisic acid is known as</p> <p>A) Ketonuria</p> <p>B) Hematuria</p> <p>C) Phenylketonuria</p> <p>D) Alkaptonuria</p>	Recognize	Remember
7	<p>In a diploid organism, two different alleles of a gene are both expressed in a heterozygous individual, and the condition is termed _____</p> <p>A) Polygenic</p> <p>B) Multigenic</p> <p>C) Co-dominance</p> <p>D) Recessive</p>	Recall	Remember
8	<p>The inability to metabolize fructose due to the absence of aldolase B enzyme is</p> <p>A) Galactose intolerance</p> <p>B) Sugar intolerance</p> <p>C) Fructose intolerance</p> <p>Carbohydrate intolerance</p>	Recall	Remember

9	A person suffering from phenylketonuria on consumption food containing high phenylalanine may lead to the accumulation of A) Phenylalanine B) Phenylpyruvate C) Tyrosine D) Isoleucine	Identify	Remember
10	In autosomal recessive disorders, what is the percentage that a child will be affected with a disorder if both parents are heterozygous? A) 100% B) 75% C) 50% D) 25%	Identify	Remember
PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50			
21	Write a short note on Human Genome Project. Enlist the differences between nuclear and mitochondrial genomes.	Explain	Understand
22	Describe the structure and different types of chromosomes with the diagram	Explain	Understand
23	a. What is the difference between euchromatin and heterochromatin? (b) What is the difference between epistasis and hypostasis?	Differentiate Define	Cite Examples
24	a. What is the difference between genotype and phenotype? (b) How do incomplete dominance and codominance differ?	Differentiate	Explain
27	Define Inborn Error of Metabolism? Write down the differences between Phenylketonuria and Alkaptonuria	Explain	Difference and Define

Semester - II

SEMESTER - II					
Course Code	Course Name	L	T	P	Credits
EPH-S2-06	Applied Epidemiology and Public Health	2	1	0	3

a. Course Outcome (CO)

On the successful completion of the course, the student will be able to

	Course Outcome	Level
CO 1	To understand several epi study designs	Understand
CO 2	To apply the concept of epidemiological measurements errors and their influences on deciphering disease and health status in community	Apply
CO 3	Analyse the outbreak of the diseases in the community	Analyse
CO 4	Development of epidemiological models to delineate the outbreak of diseases	Create
CO 5	Hands on experience on systematic review and metanalysis	Skill

b. Syllabus

Units	Content	Hrs.
I	<p>Epidemiological study designs</p> <p>Cross-sectional study: Design and analysis of cross-sectional study, sample size and power calculations, STROBE guidelines, Examples of cross-sectional studies , Case control study: Design, advantages and disadvantages of Case-Control study, Analysis of unmatched case-control studies; stratified analysis; effect modification; analysis of matched case-control studies – conditional logistic regression models., sample size and power calculations, measures of association in case-control studies, Example of case-control study. Cohort study: Design of prospective and retrospective cohort study, sample size and power calculations, nested case-control study design, analysis of longitudinal/cohort data - multilevel modelling and survival analysis, advantages and disadvantages of cohort study, Example of cohort study. Randomized controlled trial (RCT): Conceptual features clinical trial, framing the question, Inclusion and exclusion criteria, validity, Randomization, Stratification (and blocking), Blinding, phases of RCT, Analysis of RCT studies, and effect size calculations</p>	12
II	<p>Bias in epidemiologic studies</p> <p>Errors in epidemiology, biases, Selection bias and Information bias, identifying non-causal associations (Confounding), framing confounding , assessing and addressing confounding , Prevention through design, Restriction and stratification, Matching, Adjustment during analysis External and Internal weighting schemes (M-H, inverse of variance), Studies of intended vs unintended effects, Confounding by indication, Confounding by contraindication, Residual confounding, Effect modification, ecologic fallacy</p>	12
III	Infectious disease epidemiology	12

	Basic concepts of outbreak investigation, case studies on field epidemiology, transmission dynamics models; SI, SIS, and SIR models; Kermack- McKendrick threshold theorem; basic reproductive number (R_0); what determines R_0 ; endemic vs. epidemic; effective reproductive number (R_e); eradication threshold; other considerations while vaccinating; estimating R_0 , vaccine efficacy	
IV	<p>Systematic Reviews and Meta-Analysis</p> <p>Steps in conducting a systematic review - Develop an answerable question using the “Participants Interventions Comparisons Outcomes” (PICO) framework - Describe the process used to collect and extract data, Describe and interpret the results of meta-analyses</p> <p>Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist and RevMan software for meta-analysis, Publication bias</p>	12
	<p>Tasks and Assignments:</p> <p>Each student is required to submit the following:</p> <ul style="list-style-type: none"> ✓ Case study regarding the several epi study designs ✓ Preparation of systematic review and metanalysis report <p>References:</p> <ol style="list-style-type: none"> 1. Lilienfeld, D. E., & Stolley, P. D. (1994). Foundations of epidemiology. Oxford University Press, USA. 2. Gordis L. (2014). Epidemiology, 5th Edition. WB Sanders Co, Philadelphia 3. Merrill, R. M. (2015). Introduction to epidemiology. Jones & Bartlett Publishers. 4. Park, K (2017) Parks Text Book Of Preventive & Social Medicine, BanarsidasBhanot Publishers 5. Pearce, Neil. (2005) A short Introduction Epidemiology. Centre for Public Health Research, Massey University, Wellington, New Zealand, pp. 130 ISBN: 0-473-09560-2 6. Woodward, M. (2013). Epidemiology: study design and data analysis. CRC press. 	

c. Mapping of Program Outcomes with Course Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	2	2	1	3	2
CO5	1	1	1	1	2

d. Evaluation Scheme

	CO1	CO2	CO3	CO4	CO5	Total
Internal	10	10	5	5	10	40
External	12	12	12	12	12	60
Total	20	20	20	20	20	100

e. Mapping Course Outcome with Internal Assessment (40 Marks)

	CO1	CO2	CO3	CO4	CO5
Assignments	5	5	-	-	5
Test	5	5	5	5	5
Total	10	10	5	5	10

f. Mapping Course Outcome with External Assessment (60 Marks)

Category	CO1	CO2	CO3	CO4	CO5
Part – A (Objective - 10 x 1 = 10 marks)	2	2	2	2	2
Part – B (Short Answer - 5 x 10 = 50 marks)	10	10	10	10	10-
Total	12	12	12	12	12

g. Rubric for Assignments

Sl. No.	Criteria	100%	75%	50%	25%	0%	Relation to COs
1	Content 50%	Ideas are detailed, well developed, supported with specific evidence & facts and examples	Ideas are detailed, Developed and supported with evidence and facts mostly specific.	Ideas are presented but not particularly developed or supported.	Content is not sound	Not attended	CO1, CO2, CO5
2	Organization 50%	Includes title, introduction, statement of the main idea with illustration and conclusion.	Includes title, introduction, statement of main idea and conclusion.	organizational tools are weak or missing	No organization	Not attended	CO1, CO2, CO5

i. Model Question Paper

Sl. No.	Model Questions	Specification	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	Odds ratio can be calculated from: (A) Case control study (B) Cohort study (C) RCTs (D) Longitudinal study	Recognize	Remember
2	Analytical sensitivity denotes (A) Antigen detection (B) Enzyme detection (C) Refinement (D) Both a & b	Recall	Remember
3	Kappa value >0.90 indicates (A) No agreement (B) Perfect agreement (C) Good agreement (D) All	Recognize	Remember
4	The number of cases of monkeypox among secondary contacts = 5. The total number of secondary household contacts = 37. Therefore, the	Recognize	Assesr

	secondary attack rate (A) 12.5% (B) 13.5% (C) 16.5% (D) None		
5	Screening is done to assess negative cases which is called as: (A) Sensitivity (B) Specificity (C) Positive predictive value (D) none	Recognize	Remember
6	The number of prevalent cases among men is 62. There were 210 men tested. Therefore, the prevalence of malaria in men is (A) 40% (B) 30% (C) 20% (D) 10%	Recognize	Asses
7	Validity of a test includes: (A) Sensitivity (B) Specificity (C) both (D) none	Recall	Remember
8	To be causally associated with disease, the etiological factor should fulfill the following criteria: Indicate all that apply. (A) The factor is present in all subjects with the disease. (B) Elimination of the factor reduces risk of the disease. (C) The exposure to this factor should precede the development of the disease. (D) The factor is more prevalent among those with the disease than among those without the disease.	Recall	Analyse
9	A pharmaceutical company showed the following in an article: "1500 subjects with a cold were treated with our new medicine. Within three days, 95% were asymptomatic and this result was statistically significant." The company claims the new medicine was effective. Is this conclusion justified? (A) Yes, because the effect was very large (95% of the subjects benefitted from treatment). (B) No, because statistical significance indicates that the null hypothesis ("no effect") was correct. (C) No, because no control group was involved in the study. (D) Yes, because the effect of treatment could not be explained by chance	Identify	Analyse
10	Odds ratio can be calculated by (A) ad/bc (B) $a/a+b$ (C) both (D) none	Identify	Remember
	PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50		
1	Differentiate and explain the following: A) Endemic vs Epidemic; B) RCTs vs Observational study ; C) Attack rate vs Secondary Attack rate ; D) Diagnostic specificity vs Analytical specificity ; E) Surveillance vs Monitoring	Differentiate Define	Understand
2	A. What is case control study? B. During a study of 20 years five people are followed to measure the occurrence of upper respiratory tract infection. As this infection can occur more than once, all disease events are included in this study. • 1 person is lost to follow-up after 1.5 years. • 2 persons died respectively after 10 and 15 years from a different cause. • 1 person got the first respiratory tract infection after seven years and the second infection after 12 years of follow-up. Both infections take half a year of recovery. This person is followed-up until the end of the study. One person is followed-up the whole period without occurrence of disease. What is the incidence rate in this study?	Explain	Skill
3	Explain the steps involved in the investigation of diseases in a community? There is a cholera outbreak in a community, how do you follow the steps of disease investigation	Understand	Apply
4	What are confounding factor and bias? How do you control them in a case control study?	Explain	Cite Examples
5	Explain the role of strobe list and PRISMA guidelines	Explain	Understand

SEMESTER - II					
Course Code	Course Name	L	T	P	Credits
EPH-S2-07	Demography and Population Studies	2	1	0	3

a. Course Outcome (CO)

On the successful completion of the course, the student will be able to

	Course Outcome	Level
CO 1	To develop an understanding on broad population dynamics, fertility and family dynamics, health, aging, and mortality	Understand
CO 2	To apply the resources like census, registry and other data repositories for measuring the population growth	Apply
CO 3	Analyse the population census and other data repositories regarding demography for assessing the family dynamics	Analyse
CO 4	Development of population growth model	Create
CO 5	Hands on experience on calculation of several measurements in epidemiology	Skill

b. Syllabus

Units	Content	Hrs.
I	Introduction of Population and Demographic Study Brief historical background, Demography in modern times, Phases of history of Demography, Definition, Nature and Scope of Demography, Demography and other disciplines, Basic concepts, Theories of Population, Population Policy, Kinds of Population Policy, Population growth and health services, Population growth and education, Population growth and food supplies.	12
II	Methods and Sources of Data Collection Census method, Sampling method for population data, Registration Method, National Sample Survey, Double Report System, International Resources, Importance of Population Statistics. Census 2011, International Statistical Organization and their data	12
III	Fertility Definition, Need for Fertility, Fecundity, Data sources of Fertility, Peculiarities of Birth data, Factors affecting Fertility, Causes responsible for higher fertility in developing countries, Social determinants of fertility, Fertility rate, Features of Birth statistics, Method of conception control, Birth Control, Family Planning	12

<p style="text-align: center;">IV</p>	<p>Mortality and Migration</p> <p>Brief historical background, Definition, Source of data, Limitation of Mortality data, Analysis of Mortality statistics, Causes of death, Differential Mortality, Environmental Influences on Death rates, Maternal mortality rate, Infant mortality, Sterility, Crude death rate, Morbidity and Mortality, Life tables, Life expectancy, Migration in India, Urbanization</p>	<p style="text-align: center;">12</p>
	<p>Tasks and Assignments:</p> <p>Each student is required to submit the following:</p> <ul style="list-style-type: none"> ✓ Case study regarding the demographic status and migration pattern of developed, developing and underdeveloped countries ✓ Critical review of the literature to assess the health indicators of OECD, ASEANS, PACIFIC, AMERICAS based on current census <p>References:</p> <ol style="list-style-type: none"> 1. Bhende, A.A. & Kanitkar, T. Principles of Population Studies Himalaya Publishing House. ISBN-13: 978-8184885347. 2. Hans, R., 1996, Population Studies: Fundamentals of Demography. Surjeet Publications. 3. Bogue, Donald J., 1969, Principle of Demography. New York: John Wiley and Sons. 4. Srinivasan, K. and Mukherjee, S., 1979, Dynamics of Population and Family Welfare in India, Bombay: International Institute of Population Sciences. 5. Harrison, G.A., 1977, Population Structure and Human Variation, Cambridge University Press, Cambridge. 6. Narayan, V. and Prakasam, C.P., 1983, Population Policy; Perspectives in Developing countries. Bombay: Himalays Publishing House. 7. Sen, A.K., 1985. Demography and Socio- economic conditions of the four Primitive Tribes, Indian Anthropologist, New Delhi. 8. Agarwala, S.N., 1997, India's Poulation Problems. Tata Mc Graw Hill, New Delhi. 9. Donald, J. B., 1984, Demography: A Recent Trend. Oxford Pulication. 10. Davis, K., 1951, The Population of India and Pakistan: Princeton University, Princeton. 11. Cox, P.R., 1979, Demography, Vikas Publishing House, New Delhi. 12. Mass M and Geoffrey J.D. H., 2009, Social and Demographic, A Ceainting, Cambridge University Press 13. Jay W. and Vijayan K.P., 2009, Demography: The Science of Population, Amazon Publication. 14. Sen., Germaine and Chen (eds), 1994 - Population Policies Reconsidered: Health Empowerment and Rights, Cambridge, Mass, Harvard University Press 15. McHugh, R. B. (1969). Introduction to Demography. American Journal of Public Health and the Nation's Health, 59(1), 188-188. 16. Kocher, J. E. (1980). Population policy in India: recent developments and current prospects. Population and Development Review, 299-310. 17. Bongaarts, J. (1994). Population policy options in the developing world. East Asia, 5(2.3), 13-75. 	

	<p>18. Robinson W.C and Ross, J. A. (2007). The Global Family Planning Revolution: Three Decades of Population Policies and Programs. Edited by Washington, DC: The World Bank. Pp. xviii 470. ISBN: 978-0- 8213-6951-7 3)</p> <p>7. J.S.Weiner and J.A.Lourie, 1969, Human Biology: A Guide to Field Methods. IBP Hand Book No. 9., Oxford : Blackwell Scientific Publication.</p>	
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c. Mapping of Program Outcomes with Course Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	2	2	1	3	2
CO5	1	1	1	1	2

d. Evaluation Scheme

	CO1	CO2	CO3	CO4	CO5	Total
Internal	10	10	5	5	10	40
External	12	12	12	12	12	60
Total	20	20	20	20	20	100

e. Mapping Course Outcome with Internal Assessment (40 Marks)

	CO1	CO2	CO3	CO4	CO5
Assignments	5	5	-	-	5
Test	5	5	5	5	5
Total	10	10	5	5	10

f. Mapping Course Outcome with External Assessment (60 Marks)

Category	CO1	CO2	CO3	CO4	CO5
Part – A (Objective - 10 x 1 = 10 marks)	2	2	2	2	2
Part – B (Short Answer - 5 x 10 = 50 marks)	10	10	10	10	10-
Total	12	12	12	12	12

g. Rubric for Assignments

Sl. No.	Criteria	100%	75%	50%	25%	0%	Relation to COs
1	Content 50%	Ideas are detailed, well developed, supported with specific evidence & facts and examples	Ideas are detailed, Developed and supported with evidence and facts mostly specific.	Ideas are presented but not particularly developed or supported.	Content is not sound	Not attended	CO1, CO2, CO5

2	Organization 50%	Includes title, introduction, statement of the main idea with illustration and conclusion.	Includes title, introduction, statement of main idea and conclusion.	organizational tools are weak or missing	No organization	Not attended	CO1, CO2, CO5
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i. Model Question Paper

Sl. No.	Model Questions	Specification	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	According to Census 2011, the least populated state in the country is A. Goa B. Sikkim C. Mizoram D. Nagaland	Recognize	Remember
2	The female literacy levels according to the Literacy Rate 2011 census are A. 75.46% B. 85.49% C. 65.46% D. 63.46	Recall	Remember
3	According to Census 2011, which among the following registered highest population growth rate of 111.01 percent? A. Kurung Kumey of Arunachal Pradesh B. Longleng district of Nagaland C. Serchhip district of Mizoram D. Mahe district of Puducherry	Recognize	Remember
4	Which age group among the following is the best age to procreate from a physical standpoint? A. Ages 36-40 B. Ages 31-35 C. Ages 25-30 D. Ages 18-24	Recognize	Remember
5	Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA) was launched by A. Ministry of Education B. Home Ministry C. Prime Minister Office D. Ministry of Health and Family Welfare	Recognize	Remember
6	Periodic Abstinence also known as A. fertility awareness B. natural family planning C. rhythm method D. All of the above	Recognize	Remember
7	Pull factors of migration A. better working conditions B. lack of work opportunities	Recognize	Remember

	<p>C. poor economic conditions D. poverty</p>		
8	<p>Which country has maximum number of Indian Migrants? A. United States B. United Arab Emirates C. Saudi Arabia D. United Kingdom</p>	Recognize	Remember
9	<p>In 2015, United Nations Member States adopted the Sustainable Development Goals, in which the eradication of world hunger was listed as a single goal A. Goal 2 B. Goal 3 C. Goal 4 D. Goal 5</p>	Identify	Remember
10	<p>Diet theory of Demography was given by A. Jouse De Castro B. Michael Thomas Sadler C. Thomas Doubleday D. Herbert Spencer</p>	Recognise	Remember
	<p style="text-align: center;">PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50</p>		
21	<p>What is Demography and Population Studies? Discuss the different phases of history of Demography</p>	Explain	Understand
22	<p>Differentiate the different methods of data collection in Demography and Population studies</p>	Differentiate Define	Understand
23	<p>Illustrate in brief about Methods of Conception Control</p>	Illustrate	Understand
24	<p>What is Fertility? Discuss in brief about the Factors Affecting Fertility</p>	Explain	Apply
27	<p>Answer the following</p> <p>a.) Define Dependency Ratio & estimate the Following: A community has 45287 children under age 14 and 4529 persons age 65 and over. The total population is 95,000. Calculate the Child Dependency Ratio and Old Age Dependency Ratio?</p> <p>b.) Define Total Fertility Rate (TFR) General Fertility Rate (GFR). Incorporate the formula and define the variable.</p>	Explain	Skill

SEMESTER - II					
Course Code	Course Name	L	T	P	Credits
EPH-S2-08	Epidemiology of Communicable and Non-Communicable Diseases/conditions of Public Health Importance	2	2	0	4

a. Course Outcome (CO)

On the successful completion of the course, the student will be able to

	Course Outcome	Level
CO 1	To understand the epidemiology, pathogenesis, diagnosis and treatment of important communicable and non-communicable diseases	Understand
CO 2	To apply the knowledge of typology, risk factors study to study in detail about the epidemiology of disease in India and across the globe	Apply
CO 3	Analyse the status of bacterial, viral, parasitic, fungal and rickettsia diseases those are emerging and public health concern	Analyse
CO 4	Develop the causation model for several diseases either communicable or non-communicable in nature	Create
CO 5	Hands on experience on analysing several health data, records on infectious diseases, maternal, child and geriatric health.	Skill

b. Syllabus

Units	Content	Hrs.
I	Epidemiology of Communicable diseases (CD) Concept, CD typology, Risk factors for CDs, Epidemiology of CDs in India, burden of CD in India, Public health interventions for CDs. Introduction to tropical diseases, Neglected tropical diseases, Emerging and re-emerging tropical diseases. Epidemiology of major diseases of public health importance : Small pox, Chicken pox, Measles, Mumps, Rubella, Influenza, , AIDS & other sexually transmitted diseases Acute respiratory infections, SARS Poliomyelitis, Viral Hepatitis, Acute diarrhoeal disease, Meningococcal meningitis, , TB, Cholera, Typhoid, Diphtheria, Whooping Cough, Trachoma, Tetanus, Leprosy, Yaws, Food poisoning, Amoebiasis, Ascariasis, Hookworm, Drucunculiasis	16
II	Epidemiology of non-communicable diseases & injuries NCD typology, Risk factors for NCDs, Epidemiology of NCDs in India, Epidemiology of intentional and unintentional injuries, Congenital diseases in India, Public health interventions for NCDs. Epidemiology of major NCDs of public health importance: Cardiovascular diseases, Coronary heart disease, Hypertension, Stroke, Rheumatic heart disease, Cancer, Diabetes, Obesity, Blindness, Accidents and injuries	16
III	Epidemiology of Zoonotic diseases Viral Diseases: Rabies, KFD, Chikungunya, Yellow Fever, Japanese	16

	encephalitis; Bacterial Diseases: Brucellosis, Leptospirosis, Plague, Human salmonellosis; Parasitic Zoonosis: Taeniasis, Hydatid disease, Leishmaniasis; Rickettsial Diseases: Scrub typhus, Murine typhus, Tick Typhus and Q fever, Prions and diseases, Bio warfare agents	
IV	<p>Public health aspect of obstetrics, paediatrics, geriatrics</p> <p>Pregnancy complications, Maternal and foetal outcomes, Infections and pregnancy, Antenatal, Prenatal, Intra-natal and Post Natal care, Lactating mother, High risk mother, Causes of maternal deaths in India, Indicators of MCH care: National goals of Child health, Neonatal and antenatal care, High risk babies, Comparison to premature birth, Low birth weight babies, Perinatal rate in India, , Perinatal mortality, Neonatal mortality rate, Post-neonatal mortality rate, Causes of infant mortality, Aspects of school health service, Mental retardation, Mental Health, Child health and infections, Integrated management of childhood illness(IMCI), Vaccination. Health problems, need, issues of aged, Health status of aged population in developed and developing countries including India, Prevention and control strategy for health problem of aged people</p>	16
	<p>Tasks and Assignments:</p> <p>Each student is required to submit the following:</p> <ul style="list-style-type: none"> ✓ Case study regarding the comparative epidemiological pattern of communicable and life style disorder in the developed, developing and underdeveloped countries ✓ Case study regarding maternal, child and geriatric health in India, across the globe. <p>References:</p> <ol style="list-style-type: none"> 1. Bonita, R., Beaglehole, R., Kjellstrom, T. (2006) Basic epidemiology. World Health Organization; 2nd ed 2. Cook, G. C., & Zumla, A. (2008). Manson's tropical diseases. Elsevier Health Sciences. 3. Park, K. (2011). Epidemiology of communicable diseases. Text book of preventive and social medicine. Jabalpur: Banarsidas Bhanot Publ, 332-335. 4. Narain, J. P., & Kumar, R. (2016). Textbook of chronic non-communicable diseases: The health challenge of 21st century, (Jaypee Brothers Medical Publishers (P) Ltd., Delhi). 1- 270 5. Hurster Madeline M (1997) Communicable and Non-Communicable Disease Basics: A Primer Bergin & Garvey. 1-168. 6. Park, K. (2011). Epidemiology of non-communicable diseases. Text book of preventive and social medicine. Jabalpur: Banarsidas Bhanot Publ, 365-404 7. Fleming, D. T., & Wasserheit, J. N. (1999). From epidemiological synergy to public health policy and practice: the contribution of other sexually transmitted diseases to sexual transmission of HIV infection. <i>Sexually transmitted infections</i>, 75(1), 3-17. 8. Gubler, D. J. (2002). The global emergence/resurgence of arboviral diseases as public health problems. <i>Archives of medical research</i>, 33(4), 330-342. 9. Baker, R., & Martinson, C. A. (1970). Epidemiology of diseases caused by <i>Rhizoctoniasolani</i>. 	

	<p><i>Rhizoctoniasolani, biology and pathology.</i></p> <p>10. Shultz, J. M., Russell, J., & Espinel, Z. (2005). Epidemiology of tropical cyclones: the dynamics of disaster, disease, and development. <i>Epidemiologic reviews</i>, 27(1), 21-35.</p> <p>11. Hood, R. I. (1960). Epidemiology of communicable diseases. <i>American Journal of Public Health and the Nations Health</i>, 50(2), 271-272.</p> <p>12. Lee, I. M., Shiroma, E. J., Lobelo, F., Puska, P., Blair, S. N., Katzmarzyk, P. T., & Lancet Physical Activity Series Working Group. (2012). Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. <i>The lancet</i>, 380(9838), 219-229.</p> <p>13. Smith, A. H., Lingas, E. O., & Rahman, M. (2000). Contamination of drinking-water by arsenic in Bangladesh: a public health emergency. <i>Bulletin of the World Health Organization</i>, 78(9), 1093-1103</p>	
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c. Mapping of Program Outcomes with Course Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	2	2	1	3	2
CO5	1	1	1	1	2

d. Evaluation Scheme

	CO1	CO2	CO3	CO4	CO5	Total
Internal	10	10	5	5	10	40
External	12	12	12	12	12	60
Total	22	22	17	17	22	100

e. Mapping Course Outcome with Internal Assessment (40 Marks)

	CO1	CO2	CO3	CO4	CO5
Assignments	5	5	-	-	5
Test	5	5	5	5	5
Total	10	10	5	5	10

f. Mapping Course Outcome with External Assessment (60 Marks)

Category	CO1	CO2	CO3	CO4	CO5
Part – A (Objective - 10 x 1 = 10 marks)	2	2	2	2	2
Part – B (Short Answer - 5 x 10 = 50 marks)	10	10	10	10	10-
Total	12	12	12	12	12

g. Rubric for Assignments

Sl. No.	Criteria	100%	75%	50%	25%	0%	Relation to COs
1	Content 50%	Ideas are detailed, well developed, supported with specific evidence & facts and examples	Ideas are detailed, Developed and supported with evidence and facts mostly specific.	Ideas are presented but not particularly developed or supported.	Content is not sound	Not attended	CO1, CO2, CO5
2	Organization 50%	Includes title, introduction, statement of the main idea with illustration and conclusion.	Includes title, introduction, statement of main idea and conclusion.	organizational tools are weak or missing	No organization	Not attended	CO1, CO2, CO5

i. Model Question Paper

Sl. No.	Model Questions	Specification	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	Queetelet index is related to (A) Blindness (B) Obesity (C) AIDS (D) Cancer	Recognize	Remember
2	API is associated with (A) Scrub typhus (B) Japanese Encephalitis (C) Tuberculosis (D) Malaria	Recognize	Remember
3	Hydatid cyst is caused by (A) <i>Onchocerca volvulus</i> (B) <i>Amblyomma variegatum</i> (C) <i>Echinococcus granulosus</i> (D) <i>Pneumocystis carinii</i>	Recognize	Remember
4	The following is not a zoonotic disease (A) Scrub typhus (B) Brucellosis (C) Kyasanur forest disease (D) Zika	Recognize	Remember
5	The emerging vector of malaria is (A) <i>Anopheles stephensi</i> (B) <i>Anopheles minimus</i> (C) <i>Anopheles subpictus</i>	Recognize	Remember

	(D) <i>Anopheles sundaicus</i>		
6	Most common cause of stroke is (A) Cerebral haemorrhage (B) Cerebral thrombosis (C) Cerebral embolism (D) Hypertension	Recognize	Remember
7	Rule of halves is applicable to (A) Meningitis (B) Filariasis (C) Malaria (D) Hypertension	Recognize	Remember
8	Pseudo membrane in the posterior pharynx is associated with (E) Mumps (F) Measles (G) Rubella (H) Diphtheria	Recognize	Remember
9	The epidemiological marker of Hepatitis B infection is (A) Hepatitis B envelope antigen (B) Hepatitis B core antigen (C) Hepatitis B surface antigen (D) None of the above	Identify	Remember
10	<i>Bordetella pertussis</i> causes (A) Whooping cough (B) Diphtheria (C) Cerebral embolism (D) All of the above	Identify	Remember
	PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50		
1	Discuss the important features of the following diseases with respect to epidemiology, risk factors, pathogenesis, prevention and control of <ul style="list-style-type: none"> • Diabetes mellitus • Avian Influenza 	Explain	Understand
2	Discuss about emerging and re-emerging communicable diseases	Cite Examples	Understand
3	Detail the investigation steps one has to undertake in case of an infectious disease outbreak	Explain	Understand
4	Discuss the important features of the following diseases with respect to epidemiology, diagnosis, prevention and control. <ul style="list-style-type: none"> • Kyasanur forest disease • Chikungunya 	Illustrate	Apply
5	Discuss the important features of the following diseases with respect to epidemiology, risk factors, pathogenesis, diagnosis, prevention and control. Scrub typhus Japanese encephalitis	Illustrate	Apply

SEMESTER - II					
Course Code	Course Name	L	T	P	Credits
EPH-S2-09	Health Care Systems	1	2		3

Course Outcome (CO)

- On the successful completion of the course, the student will be able to

	Course Outcome	Level
CO 1	To learn the overview of healthcare systems and its building blocks	Understand
CO 2	To compare and contrast major healthcare system models around the world	Apply
CO 3	Examine the current healthcare system in India using existing health system research frameworks	Analyse
CO 4	Link public health infrastructure development to the health system intermediate and final outcomes	Create
CO 5	Develop health system research skills to critically analyse the health systems around the world	Skill

b. Syllabus

Units	Content	Hrs.
I	Introduction to healthcare systems Healthcare system building blocks, provision of care, access, financing, regulations, attributes of an ideal healthcare system, measuring health system performance, Use of WHO measurement framework	12
II	Types of major healthcare systems around the world Managed healthcare system in USA- concept, process and insurance systems and its challenges, Nation Health Service in UK- recent reforms and Challenges, Cuban Healthcare system, Scandinavian Healthcare system- social health insurance and challenges	12
III	Healthcare infrastructure in India Introduction to Indian Healthcare system, Primary healthcare in India, Health service development in India, National Health Programs, Recent reforms and challenges, Innovations and good practices in healthcare delivery	12
IV	Health system research WHO framework for health system research, Tanahashi Framework, Evolution of global healthcare systems, philosophical perspectives of health system research and ideas of “systems thinking”, siloed versus health system approach, types of health system research and challenges	12

	<p>Tasks and Assignments:</p> <p>Each student is required to submit the following:</p> <ul style="list-style-type: none"> ✓ Seminar presentation on healthcare systems of selected countries ✓ Report on major healthcare programs/schemes in India <p>References:</p> <ol style="list-style-type: none"> 1. Gilson, L., Hanson, K., Sheikh, K., Agyepong, I. A., Ssenooba, F., & Bennett, S. (2011). Building the field of health policy and systems research: social science matters. <i>PLoS medicine</i>, 8(8), e1001079. 2. Sheikh, K., George, A., & Gilson, L. (2014). People-centred science: strengthening the practice of health policy and systems research. <i>Health Research Policy and Systems</i>, 12(1), 19. 3. Gilson, L., & World Health Organization. (2013). <i>Health policy and system research: A methodology reader: The abridged version</i>. World Health Organization. 4. Rice T, Rosenau P, Unruh LY, Barnes AJ, Saltman RB, van Ginneken E. United States of America: Health system review. <i>Health Systems in Transition</i>, 2013; 15(3): 5. Seán Boyle: United Kingdom (England): Health system review. <i>Health Systems in Transition</i>, 2011; 13(1):1–486. 6. De Vos P. 2005. Health report on Cuba. “No one left abandoned”: Cuba’s national health system since the 1959 revolution. <i>International Journal of Health Services</i> 35: 189–207. 7. De Vos P, Murla´ P, Rodriguez A et al. 2005. Shifting the demand for emergency care in Cuba’s health system. <i>Social Science and Medicine</i> 60: 609–16. 8. Torjesen, D. O., Hansen, H. F., Pinheiro, R., & Vrangbæk, K. (2017). The Scandinavian Model in Healthcare and Higher Education: Recentralizing, decentralizing or both? <i>Scandinavian Journal of Public Administration</i>, 21(1), 57-88. 9. Brook RH. (2015) Exploiting the knowledge base of health services research, in redefining health care systems, RAND: Santa Monica, US. 	
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c. Mapping of Program Outcomes with Course Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	2	2
CO2	3	2	3	3	3
CO3	3	3	3	3	3
CO4	2	2	2	3	1
CO5	3	2	3	3	3

d. Evaluation Scheme

	CO1	CO2	CO3	CO4	CO5	Total
Internal	10	10	5	5	10	40
External	12	12	12	12	12	60
Total	20	20	20	20	20	100

e. Mapping Course Outcome with Internal Assessment (40 Marks)

	CO1	CO2	CO3	CO4	CO5
Assignments	5	5	-	-	5
Test	5	5	5	5	5
Total	10	10	5	5	10

f. Mapping Course Outcome with External Assessment (60 Marks)

Category	CO1	CO2	CO3	CO4	CO5
Part – A (Objective - 10 x 1 = 10 marks)	2	2	2	2	2
Part – B (Short Answer - 5 x 10 = 50 marks)	10	10	10	10	10-
Total	12	12	12	12	12

g. Rubric for Assignments

Sl. No.	Criteria	100%	75%	50%	25%	0%	Relation to COs
1	Content 50%	Ideas are detailed, well developed, supported with specific evidence & facts and examples	Ideas are detailed, Developed and supported with evidence and facts mostly specific.	Ideas are presented but not particularly developed or supported.	Content is not sound	Not attended	CO1, CO2, CO3
2	Organization 50%	Includes title, introduction, statement of the main idea with illustration and conclusion.	Includes title, introduction, statement of main idea and conclusion.	organizational tools are weak or missing	No organization	Not attended	CO1, CO4, CO5

Sl. No.	Model Questions	Specification	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	Give an example of a country with major private health financing and private health service provision A) Germany	Recognize	Remember

	<p>B) UK</p> <p>C) France</p> <p>D) Cuba</p>		
2	<p>State whether the following statement is TRUE or FALSE</p> <p>" The new definition of health service coverage is -The probability of receiving a necessary health intervention conditional on the presence of a health care need."</p> <p>A. True</p> <p>B. False</p>	Recall	Remember
3	<p>..... is an outcome/impact indicator according WHO performance measurement</p> <p>A. Access to care</p> <p>B. Quality of care</p> <p>C. Efficiency</p> <p>D. Patient satisfaction</p>	Recognize	Remember
4	<p>Which statement/statements is/are correct about vertical equity?</p> <p>A. People with similar needs to be treated similarly.</p> <p>B. People with dissimilar needs should be treated differently.</p> <p>C. Everyone should be treated same</p> <p>D. Increasing productivity while controlling cost</p> <p>E. All of the above</p>	Recognize	Remember
5	<p>Which statement/statements is/are correct about universal health coverage</p> <p>A. Healthcare delivery that does not cover the entire range of promotion, prevention, care, rehabilitation and palliative care services and / or services that do not continue over time.</p> <p>B. Absence of geographical, sociocultural, or gender barriers that prevent all people from making use of comprehensive health services.</p> <p>C. Sufficient organizational mechanisms and financing to cover the entire population</p> <p>D. All people have access to the health services they need, when and where they need them, without financial hardship</p>	Recognize	Remember
6	<p>Select any two federal funded welfare/ insurance schemes in USA</p>	Recognize	Remember

	<ul style="list-style-type: none"> a) Medclaim b) Medicare c) CHIP d) Veteran Health Care 		
7	<p>Commission on Social Determinants of Health was established in</p> <ul style="list-style-type: none"> A) `1978 B)2000 C)2005 D)2020 	Recall	Remember
8	<p>The Alma Ata Declaration was passed in</p> <ul style="list-style-type: none"> A) 1948 B) 1978 C) 1998 D)2018 	Recall	Remember
9	<p>Give an example of a country in which healthcare is provided through mandatory public health insurance schemes which are delivered through a mix of public and private hospitals</p> <ul style="list-style-type: none"> a) Canada b) Japan c) USA d) Germany 	Identify	Remember
10	<p>Canada's Medicare is run bygovernment and ispayer system</p> <ul style="list-style-type: none"> a) provincial, single b) territorial, multi-payer c) federal, single d) federal, multi-payer 	Identify	Remember
<p>PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50</p>			
21	<p>What are the major managed healthcare plans in USA and how they differ from each other?</p>	Differentiate Define	Understand
22	<p>Explain the structure of rural healthcare system in India with the population norms at each level according to IPHS.</p>	Explain	Understand
23	<p>Explain major models or frameworks to measure the concept of</p>	Explain	Understand

	coverage in healthcare system.		
24	Draw and explain the WHO's Health system performance measurement matrix with inputs, outputs and outcomes.	Illustrate	Apply
27	<p>Read the case study given below carefully and answer the following questions:</p> <p>a) What are the major healthcare problems of Rohingya refugees in Bangladesh</p> <p>b) Whether the healthcare system has responded to the need of the refugees? What are the services provided in the refugee camps?</p> <p>c) How should a health system respond to the health needs of persecuted minorities and of refugees? (list them based on WHO health system building blocks)</p> <p>d) If you were the health administrator for the refugee camp,</p> <p>I. list three specific outputs/process indicators for pregnant women (1 mark)</p> <p>II. list three specific outcome/impact indicators for children less than 5 years</p>	Assess	Apply Skill

SEMESTER - II					
Course Code	Course Name	L	T	P	Credits
EPH-S2-10	Health Policies, Programs, Laws and Evaluation	2	1	0	3

Course Outcome (CO)

- On the successful completion of the course, the student will be able to

	Course Outcome	Level
CO 1	To learn the relevance various stakeholders in policy development to improve health status of population	Understand
CO 2	To check relevance of strategies/ interventions in national health programmes	Apply
CO 3	Examine the relevance of public health acts in public health promotion	Analyse
CO 4	Link public health acts to develop effective interventions to handle health problems	Create
CO 5	Develop skills too critically analyse the outcome of various national programmes/ Acts	Skill

Units	Content	Hrs.
I	Health Policy, Planning & Evaluation Health and Development, Role of policy programmes and law in health status, Institutional and non-institutional role in health policy formulation and implementation. National Health Policy 2017. National Health Mission. Health system development and strengthening, Health Policy and analysis – policy actors, focus and forms of policy analysis – policy analysis triangle	12
II	National Health Programmes in India Background objectives, action plan, targets, operations, achievements and constraints in various National Health Programme. National Population policy, Family planning programmes in India, Census, other data sources & its impact on health planning in India	12
III	Public Health Laws-I Important health Acts in India-I: Drug, birth and death, important health Acts in India- II: Medical termination of pregnancy Act, the pre-natal diagnostic techniques Act. Prevention of adulteration Act, Employee State Insurance Act, Consumer protection Act and Factories Act 1948, IHR	12
IV	Public Health Laws-II Health as a right and the global and Indian legal framework (including health as a state subject and the requirements of state laws for national promulgations etc), Sexual health, human rights and law, Gender-based violence (including medical violence, eg forced sterilisations, forced abortions, harmful treatments of fertility, FGM), Laws regarding HIV disclosure, regulations regarding health care institutions (Structure and	12

	functioning), Article 377 and Bio-medical waste rules, the transplantation of human organs Act. Surrogacy Regulation Bill, Epidemic Diseases Act, Disaster Management Act, the Essential Services Maintenance Act	
	<p>Tasks and Assignments:</p> <p>Each student is required to submit the following:</p> <ul style="list-style-type: none"> ✓ Case study regarding the national health program in India ✓ Case study regarding public health laws being adapted by institutions <p>References:</p> <ol style="list-style-type: none"> 1. Collins, C., Green, A. (2014). Valuing Health Systems: A Framework for Low and Middle Income Countries. SAGE Publications. 2. Gupta, R.P. (2016). Health Care Reforms in India: Making Up for the Lost Decades. Elsevier India 3. De Savigny, D., Adam, T., Policy, A. for H., Research, S., Organization, W.H., (2009). Systems Thinking for Health Systems Strengthening, Alliance Flagship report series. Alliance for Health Policy and Systems Research. 4. Gilson, L., Alliance for Health Policy and Systems Research, World Health Organization, (2012). Health policy and systems research: a methodology reader. 5. Starfield, B., & Shi, L. (2002). Policy relevant determinants of health: an international perspective. Health Policy, 60(3), 201-218. 6. Reich, M. R. (1995). The politics of health sector reform in developing countries: three cases of pharmaceutical policy. Health Policy, 32(1), 47-77. 	

c. Mapping of Program Outcomes with Course Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	2	2
CO2	3	2	3	3	3
CO3	3	3	3	3	3
CO4	2	2	1	3	2
CO5	1	2	3	1	2

d. Evaluation Scheme

	CO1	CO2	CO3	CO4	CO5	Total
Internal	10	10	5	5	10	40
External	12	12	12	12	12	60
Total	20	20	20	20	20	100

e. Mapping Course Outcome with Internal Assessment (40 Marks)

	CO1	CO2	CO3	CO4	CO5
Assignments	5	5	-	-	5
Test	5	5	5	5	5
Total	10	10	5	5	10

f. Mapping Course Outcome with External Assessment (60 Marks)

Category	CO1	CO2	CO3	CO4	CO5
Part – A (Objective - 10 x 1 = 10 marks)	2	2	2	2	2
Part – B (Short Answer - 5 x 10 = 50 marks)	10	10	10	10	10-
Total	12	12	12	12	12

g. Rubric for Assignments

Sl. No.	Criteria	100%	75%	50%	25%	0%	Relation to COs
1	Content 50%	Ideas are detailed, well developed, supported with specific evidence & facts and examples	Ideas are detailed, Developed and supported with evidence and facts mostly specific.	Ideas are presented but not particularly developed or supported.	Content is not sound	Not attended	CO1, CO2, CO5
2	Organization 50%	Includes title, introduction, statement of the main idea with illustration and conclusion.	Includes title, introduction, statement of main idea and conclusion.	organizational tools are weak or missing	No organization	Not attended	CO1, CO2, CO5

Sl. No.	Model Questions	Specification	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	The latest health policy was passed by the Legislature in E) 2017 F) 2003 G) 2019 D) 2014	Recognize	Remember
2	National Rural Health Mission integrates A) All national laws and acts B) All national health programmes C) Health Service and Research D) All the Above	Recall	Remember
3	According to the National Population Policy, India aims to stabilise the TFR at	Recognize	Remember

	<p>A) 2.8</p> <p>B) 2.7</p> <p>C) 1.8</p> <p>D) 2.1</p>		
4	<p>Medical termination of Pregnancy Act aims to</p> <p>A) Provide safe abortion facilities to all women</p> <p>B) Provide safe abortion facilities only to married women</p> <p>C) Neither A Nor B</p> <p>D) Legalise sex-selective abortion</p>	Recognize	Remember
5	<p>ESI Act was passed in</p> <p>A) 1948</p> <p>B) 1958</p> <p>C) 1968</p> <p>D) 1978</p>	Recognize	Remember
6	<p>Health Policy is</p> <p>A) Absolute and Binding on the Government</p> <p>B) It gives direction to the government about broader goals</p> <p>C) Ensures mandatory budget availability</p> <p>D) Ensures adequate manpower</p>	Recognize	Remember
7	<p>WHO was established in</p> <p>A) 1954</p> <p>B)1964</p> <p>C)1948</p> <p>D)1964</p>	Recall	Remember
8	<p>The Surrogacy Regulation Act was passed in</p> <p>D) 2022</p> <p>E) 2017</p> <p>F) 2018</p> <p>D)2019</p>	Recall	Remember
9	<p>.....represents and protects the health of workers in the workplace.</p> <p>A) ESI Act 1948</p>	Identify	Remember

	<p>B) Factories Act 1848</p> <p>C) Neither A nor B</p> <p>D) Both A and B</p>		
10	<p>Prevention of adulteration Act mandates</p> <p>A) The appointment of food inspectors</p> <p>B) The appointment of public analysts</p> <p>C) Establishing laboratories in different parts of the country</p> <p>D) All the Above</p>	Identify	Remember
	<p align="center">PART – B Long Answer</p> <p align="center">The answer should not exceed 1500 words 10x 5 = 50</p>		
21	Discuss the role of public health policy in shaping health goals in a country	Explain	Understand
22	<p>a) Differentiate: health programme and health Acts (or)</p> <p>b) Define the following concepts- Surrogacy, Census and Biomedical waste</p>	Differentiate Define	Understand
23	<p>a) Give two examples wherein PCPNDT Act failed to meet its objectives</p> <p>b) Give two shortcomings of National health Policy 2017</p>	Cite Examples	Understand
24	Illustrate the role of MTP Act in ensuring reproductive rights of women in the country	Illustrate	Apply
27	a) Assess the relevance of Factory Act and ESI Act in ensuring workers health , welfare and well-being	Assess	Skill

SEMESTER - II					
Course Code	Course Name	L	T	P	Credits
EPH-S2-E2	Vector Biology and Management	2	1	0	3

a. Course Outcome (CO)

On the successful completion of the course, the student will be able to

	Course Outcome	Level
CO 1	To understand the basic biology of vectors involved in transmission of diseases	Understand
CO 2	To apply the knowledge of vector dynamics and behaviour to study the disease transmission in community	Apply
CO 3	Analyse the status of bacterial, viral, parasitic and rickettsia diseases those are contracted by vectors	Analyse
CO 4	Develop the strategies for management and control of vectors	Create
CO 5	Hands on experience on the role of integrated vector control strategies and current green, eco-friendly strategies for prevention of vector borne diseases.	Skill

b. Syllabus

Units	Content	Hrs.
I	Introduction to Vector Borne Diseases General introduction to the biology of arthropod vectors of public health importance; Vector borne diseases with special reference to mosquitoes; Bio-ecology, feeding, breeding and resting behaviour of <i>Anopheles</i> , <i>Culex</i> , and <i>Aedes</i> mosquitoes; Biology of ticks, mites, fleas; Methods for mosquito adult and immature collection, preservation, maintenance and transportation.	12
II	Transmission biology Modes of disease transmission; Identification of pathogens in vectors with special reference to malaria and dengue, Effect of <i>Wolbachia</i> on	12

	<i>Aedes</i> mosquitoes	
III	Vector management Vector control methods; Integrated vector management; Diagnosis of important vector borne diseases; Insecticide resistance and strategies for control; Novel vector control strategies, rodent control measures	12
IV	Climate change and its impact on vector borne diseases Understanding the various components of climate change; Impact of climate change on transmission dynamics of dengue and malaria; Deforestation and its role in vector-borne diseases; Emerging malaria vectors	12
	<p>Tasks and Assignments:</p> <p>Each student is required to submit the following:</p> <ul style="list-style-type: none"> ✓ Case study regarding the comparative epidemiological pattern of vector borne diseases in developed, developing and underdeveloped countries ✓ Case study regarding climate change and emergence of VBDs <p>References:</p> <ol style="list-style-type: none"> 1. Service M. W, Medical Entomology for students. Chapman & Hall, London 2. Imms, A. D. A general text book of Entomology. ELBS, London 3. Marquardt, W.C. Biology of disease vectors (2nd Edition). Doody Enterprises, Inc.USA 4. Service, M. W. Mosquito Ecology, Field sampling methods. Applied Science Publishing Ltd., London. 5. Grafton-Cardwell, E. E., Stelinski, L. L., & Stansly, P. A. (2013). Biology and management of Asian citrus psyllid, vector of the huanglongbing pathogens. <i>Annual Review of Entomology</i>, 58, 413-432. 6. Luckhart, S., Lindsay, S. W., James, A. A., & Scott, T. W. (2010). Reframing critical needs in vector biology and management of vector-borne disease. <i>PLoS Negl Trop Dis</i>, 4(2), e566. 7. Beier, J. C., Keating, J., Githure, J. I., Macdonald, M. B., Impoinvil, D. E., & Novak, R. J. (2008). Integrated vector management for malaria control. <i>Malaria journal</i>, 7(1), 1. 8. Gubler, D. J. (1998). Resurgent vector-borne diseases as a global health problem. <i>Emerging infectious diseases</i>, 4(3), 442. 9. Gratz, N. G. (1999). Emerging and resurging vector-borne diseases. <i>Annual review of entomology</i>, 44(1), 51-75. 10. Ewald, P. W. (1983). Host-parasite relations, vectors, and the evolution of disease severity. <i>Annual Review of Ecology and Systematics</i>, 14, 465-485. 11. World Health Organization. (2004). Global strategic framework for integrated vector management. 	

c. Mapping of Program Outcomes with Course Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	3	3

CO3	3	3	3	3	3
CO4	2	2	1	3	2
CO5	1	1	1	1	2

d. Evaluation Scheme

	CO1	CO2	CO3	CO4	CO5	Total
Internal	10	10	5	5	10	40
External	12	12	12	12	12	60
Total	22	22	17	17	22	100

e. Mapping Course Outcome with Internal Assessment (40 Marks)

	CO1	CO2	CO3	CO4	CO5
Assignments	5	5	-	-	5
Test	5	5	5	5	5
Total	10	10	5	5	10

f. Mapping Course Outcome with External Assessment (60 Marks)

Category	CO1	CO2	CO3	CO4	CO5
Part – A (Objective - 10 x 1 = 10 marks)	2	2	2	2	2
Part – B (Short Answer - 5 x 10 = 50 marks)	10	10	10	10	10-
Total	12	12	12	12	12

g. Rubric for Assignments

Sl. No.	Criteria	100%	75%	50%	25%	0%	Relation to COs
1	Content 50%	Ideas are detailed, well developed, supported with specific evidence & facts and examples	Ideas are detailed, Developed and supported with evidence and facts mostly specific.	Ideas are presented but not particularly developed or supported.	Content is not sound	Not attended	CO1, CO2, CO5
2	Organization 50%	Includes title, introduction, statement of the main idea with illustration and conclusion.	Includes title, introduction, statement of main idea and conclusion.	organizational tools are weak or missing	No organization	Not attended	CO1, CO2, CO5

i. Model Question Paper

Sl. No.	Model Questions	Specification	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	The major urban malaria vector is <i>Anopheles</i> (E) <i>baimaii</i> (F) <i>fluviatilis</i> (G) <i>stephensi</i> (H) <i>vagus</i>	Recognize	Remember
2	<i>Argas persicus</i> is a (E) soft tick (F) hard tick (G) mite (H) flea	Recall	Remember
3	The substance in tick’s saliva that helps in attachment (E) chelicerae (F) cement (G) palp (H) epidermis	Recognize	Remember
4	DDT belongs to (E) pyrethroids (F) carbamates (G) organochlorine (H) none of the above	Recognize	Remember
5	Rocky mountain spotted fever is caused by (E) <i>Rickettsia</i> (F) Dinoflagellates (G) Platyhelminths	Recognize	Remember

	(H) Trypanosome		
6	<p>Lyme disease is caused by</p> <p>(E) <i>Coxiella</i></p> <p>(F) <i>Shigella</i></p> <p>(G) <i>Pasteurella</i></p> <p>(H) <i>Borrelia</i></p>	Recognize	Remember
7	<p>The best technique to incriminate a new malaria vector is</p> <p>(E) PCR</p> <p>(F) RT-PCR</p> <p>(G) ELISA</p> <p>(H) Thin and thick smear</p>	Recall	Remember
8	<p>Black flies transmit</p> <p>(E) <i>Wuchereria bancrofti</i></p> <p>(F) <i>Onchocerca volvulus</i></p> <p>(G) <i>Bacillus subtilis</i></p> <p>(H) <i>Yersinia pestis</i></p>	Recall	Remember
9	<p>KDR mutation is associated with</p> <p>(E) <i>Plasmodium vivax</i></p> <p>(F) <i>Plasmodium falciparum</i></p> <p>(G) <i>Anopheles stephensi</i></p> <p>(H) Khasanur forest disease</p>	Identify	Remember
10	<p>Climate change affects</p> <p>(E) Japanese encephalitis</p> <p>(F) dengue</p> <p>(G) scrub typhus</p> <p>(H) All of the above</p>	Identify	Remember
	<p align="center">PART – B Long Answer</p> <p align="center">The answer should not exceed 1500 words 10x 5 = 50</p>		
1	Mechanisms of insecticide resistance and strategies to slow down resistance	Explain	Understand

2	Integrated vector management (IVM) strategies to control dengue.	Explain	Apply
3	Climate change and its effect on vector-borne diseases	Explain	Understand
4	Explain in detail the Tick borne zoonosis in India	Explain	Illustrate
5	Write short notes on E. Mosquito biology F. Cyclo-developmental transmission with adequate example	Explain	Cite examples

SEMESTER - II					
Course Code	Course Name	L	T	P	Credits
EPH-S2-P2	Biostatistics using statistical softwares			2	2

b. Syllabus

Units	Content	Hrs.
I	Introduction to SPSS Starting SPSS, SPSS data editor window, SPSS syntax introduction, SPSS output, Menus and dialogue boxes, sample data entry, specifying scales, validation of data entry, importing and exporting data from excel and other formats, Screening and cleaning data, preparing codebook.	8
II	Data manipulation using SPSS: recoding, creating new variable, sorting, filtering and selection of specific data, generating simple frequencies, use of syntax editor.	8
III	Descriptive statistics: calculation of summary measures- mean, median, mode, IQR, and SD, checking normality and outliers checking through graphs.	8
IV	Parametric tests of statistical significance - one-sample, paired t test, unpaired t test, one-way and two-way ANOVA, repeated measures ANOVA. Non Parametric tests of statistical significance – Wilcoxon Rank-Sum Test, Wilcoxon Signed-Rank Test, Sign Test, Kruskal–Wallis Test, Spearman’s Rank-Order Correlation Coefficient.	8
V	Correlation and Regression: Pearson product moment correlation, Spearman rank correlation, partial correlation, correlation matrix, simple linear regression, multiple linear regressions, logistic regression: Assumptions, overall significance, multicollinearity, variable selection methods. Expertise in handling of at least one of the software - SPSS, R, STATA and SAS	8
	Tasks and Assignments: Each student is required to submit the following: <ul style="list-style-type: none"> ✓ Record books weekly once ✓ Data analysis report using SPSS with univariate, bivariate and multivariate analysis References:	

<ol style="list-style-type: none"> 1. Chernick M.R. Friis H.R., (2003) <i>Introductory Biostatistics for the Health Sciences</i>. John Wiley & Sons, Inc., Hoboken, New Jersey. 2. Douglas G. Altman, Chapman & Hall. (1991). <i>Practical Statistics for Medical Research</i> 3. Smith (2013) <i>Textbook of Bio-Statistics</i>. 4. A.K. Sharma (2005) <i>Text book of Biostatistics</i>. 5. Khanalarunhadra (2015). Mahajan's <i>Methods in Bio-statistics for Medical students and Research Workers</i>.- 8th Edition. 6. Betty Kirkwood and Jonathan Sterne (2005) <i>Essentials of Medical Statistics</i>, 2nd Edition 7. Leon Gardis (2013) <i>Epidemiology</i>, 5th Edition 8. Andy Field (2017) <i>Discovering statistics using IBM SPSS STATISTICS</i> 9. Robert Ho (2006) <i>Handbook of Univariate and Multivariate Data Analysis with IBM SPSS</i> 10. Bertram K. C. Chan (2016) <i>Biostatistics for Epidemiology and Public Health Using R</i> 	
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c. Mapping of Program Outcomes with Course Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	2	2	3	3	2
CO5	2	2	3	2	1

d. Evaluation Scheme

	CO1	CO2	CO3	CO4	CO5	Total
Internal	12	12	12	12	12	60
External	10	10	5	5	10	40
Total	22	22	17	17	22	100

e. Mapping Course Outcome with Internal Assessment (40 Marks)

	CO1	CO2	CO3	CO4	CO5
Assignments	5	5	-	-	5
Practical test	5	5	5	5	5
Total	10	10	5	5	10

f. Mapping Course Outcome with External Assessment (40 Marks)

Category	CO1	CO2	CO3	CO4	CO5
Part – A (Objective - 10 x 1 = 10 marks)	2	2	2	2	2
Part – B Experiments and Answer the Questions (5X6)	6	6	6	6	6
Total	8	8	8	8	8

g. Rubric for Assignments

Sl. No.	Criteria	100%	75%	50%	25%	0%	Relation to COs
1	Content 50%	Detailed data tabulation with correct graphical representation, use of appropriate statistical tests and statistical interpretation of the results	Data tabulation with less details, use of appropriate statistical test without interpretation	Data tabulation without graphical representation, inappropriate statistical tests	Content is not sound	Not attended	CO1, CO4, CO5
2	Organization 50%	Includes title, introduction, tables and graphs with proper labels and values, univariate, bivariate and multivariate analysis properly organized	Includes title, introduction, tables and graphs with no proper labels and values, univariate, bivariate and multivariate analysis not properly organized.	Lack of organization in statistical steps of univariate, bivariate and multivariate analysis	No organization	Not attended	CO1, CO2, CO5

i. Model Question Paper

Sl. No.	Model Questions	Specification	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	The type of variables like Religion, Blood Group, Type of mosquito etc. is..... e) Categorical –Ordinal f) Continuous g) Numerical discrete h) Categorical-Nominal	Recognize	Remember
2	Which of the following is the best for measuring central tendency for continuous variable with symmetric distribution? e) Mean f) Median g) Mode h) All of the above	Recall	Remember
3	Answer whether the following statements are True or False “It is possible to have several frequency distributions of a variable with same mean, but different variance” c) True d) False	Recognize	Remember
4	In a symmetric distribution e) mean > median > mode f) mean < median < mode g) mean > mode > median	Recognize	Remember

	h) mean < mode < median		
5	Find the 50th percentile value for the below data set "12,16, 17,21, 23, 25, 29,31, 32, 35" a)24 b)21 c)31 d)25	Analyse	Apply
6	From the bar chart, what is the most prevalent sensory impairment among 80 years and over people in USA between 1999-2006? e) Balance Impairment f) Visual Impairment g) Hearing Impairment h) Loss of feeling in the feet	Analyse	Apply
7	Which of the statements about p value is/are wrong a)It is the probability of obtaining a sample mean, given that the value stated in the null hypothesis is true. b) It varies between -1 and 1 c) We compare the p value to the criterion we set in Step 2 d) The p value for obtaining a sample outcome is compared to the level of significance.	Recall	Remember
8	55 pregnant mothers were given iron supplements for 4 months. Their blood haemoglobin level was measured before and after the program. What type of statistical tests (parametric and non-parametric) will you use to check the effectiveness of the program? e) Paired t test f) Wilcoxon Signed Rank test g) Mann whitney test h) z test	Recall	Remember
9	Pearson's correlation coefficient value for no correlation is..... a)1 b)2 c)-1 d)0	Identify	Remember
10	If type II error or β error for a statistical test is 0.20. What is the power of the test? a)0.20 b)0.05 c)0.80 d)0.90	Analyze	Apply
	PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50		
21	a) What are the different types of data? Give examples. b) List and explain at least FIVE types of data presentation.	Explain, differentiate	Understand
22	a) Define "population" and "sample". Why do we need sampling and what are the different types of sampling techniques used in epidemiological studies?	Differentiate Define	Understand

23	What are the steps involved in deciding appropriate statistical method for research? List the statistical assumptions for parametric tests.	Illustrate	Understand
24	<p>Explain the steps involved in a hypothesis testing using the following example.</p> <p>“A study reported that the population mean score in National Eligibility Test (NET) in India between the year 2000 and 2020 was 558 with a standard deviation of 139. Suppose we select a sample of 100 participants ($n = 100$). We record a sample mean equal to 575. Compute the z test for whether or not we will retain the null hypothesis at a 0.05 level of significance.”</p> <p>Note: Give each step using the example</p>	Apply	Skill
27	<p>Suppose a random variable X has a Binomial Distribution B (20, 0.20)</p> <p>a) Find the expected value (mean) of this distribution?</p> <p>b) Find the Standard Deviation of this distribution?</p> <p>c) Find the probability that $X = 10$</p> <p>d) Find the probability that $X \leq 5$</p>	Apply	Skill

SEMESTER - II					
Course Code	Course Name	L	T	P	Credits
EPH-S2-P2	Practical in Vector Biology with special reference to mosquitoes			2	2

a. Course Outcome (CO)

On the successful completion of the course, the student will be able to

	Course Outcome	Level
CO 1	To understand the basic biology of mosquito vectors involved in transmission of diseases	Understand
CO 2	To apply the knowledge of vector dynamics and behaviour to separate the mosquito species	Apply
CO 3	Analyse the several species mosquitoes and their blood meal pattern	Analyse
CO 4	Develop the green and eco-friendly techniques for mosquito control	Create
CO 5	Hands on experience on collection, handling, bioassays and dissections of mosquitoes	Skill

b. Syllabus

Units	Content	Hrs.
I	<p>Morphology, anatomy and method of collection, maintenance of vectors with special reference to mosquitoes</p> <p>Rearing, and maintenance of mosquito culture, Methods of mosquito collection from field, Blood meal Identification, Identification of mosquitoes, Dissection of midgut and salivary gland of mosquitoes, ITS-2 based classification of mosquitoes</p>	12
II	<p>Insecticidal assay protocols</p> <p>Bioassay with insecticides and calculation of LC₅₀ and LC₉₀, Larvicidal test, Adulticidal test, Cone test</p>	12
	<p>Tasks and Assignments:</p> <p>Each student is required to submit the following:</p> <ul style="list-style-type: none"> ✓ Case study regarding the available mosquito species in and Thiruvarur ✓ Case study regarding documenting the availability of locally available biological and ecofriendly substances for mosquito control. <p>References:</p> <p>12. Service M. W, Medical Entomology for students. Chapman & Hall, London</p>	

	<p>13. Imms, A. D. A general text book of Entomology. ELBS, London</p> <p>14. Marquardt, W.C. Biology of disease vectors (2nd Edition). Doody Enterprises, Inc.USA</p> <p>15. Service, M. W. Mosquito Ecology, Field sampling methods. Applied Science Publishing Ltd., London.</p> <p>16. Grafton-Cardwell, E. E., Stelinski, L. L., & Stansly, P. A. (2013). Biology and management of Asian citrus psyllid, vector of the Huanglongbing pathogens. <i>Annual Review of Entomology</i>, 58, 413-432.</p> <p>17. Luckhart, S., Lindsay, S. W., James, A. A., & Scott, T. W. (2010). Reframing critical needs in vector biology and management of vector-borne disease. <i>PLoS Negl Trop Dis</i>, 4(2), e566.</p> <p>18. Beier, J. C., Keating, J., Githure, J. I., Macdonald, M. B., Impoinvil, D. E., & Novak, R. J. (2008). Integrated vector management for malaria control. <i>Malaria journal</i>, 7(1), 1.</p> <p>19. Gubler, D. J. (1998). Resurgent vector-borne diseases as a global health problem. <i>Emerging infectious diseases</i>, 4(3), 442.</p> <p>20. Gratz, N. G. (1999). Emerging and resurging vector-borne diseases. <i>Annual review of entomology</i>, 44(1), 51-75.</p> <p>21. Ewald, P. W. (1983). Host-parasite relations, vectors, and the evolution of disease severity. <i>Annual Review of Ecology and Systematics</i>, 14, 465-485.</p> <p>22. World Health Organization. (2004). Global strategic framework for integrated vector management.</p>	
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c. Mapping of Program Outcomes with Course Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	2	2	1	3	2
CO5	1	1	1	1	2

d. Evaluation Scheme

	CO1	CO2	CO3	CO4	CO5	Total
Internal	10	10	5	5	10	40
External	12	12	12	12	12	60
Total	22	22	17	17	22	100

e. Mapping Course Outcome with Internal Assessment (40 Marks)

	CO1	CO2	CO3	CO4	CO5
Assignments	5	5	-	-	5
Test	5	5	5	5	5
Total	10	10	5	5	10

f. Mapping Course Outcome with External Assessment (60 Marks)

Category	CO1	CO2	CO3	CO4	CO5
Part – A (Viva and Practical records)	2	2	2	2	2
Part – B	10	10	10	10	10-

(Experiments with Question answers)					
Total	12	12	12	12	12

g. Rubric for Assignments

Sl. No.	Criteria	100%	75%	50%	25%	0%	Relation to COs
1	Content 50%	Ideas are detailed, well developed, supported with specific evidence & facts and examples	Ideas are detailed, Developed and supported with evidence and facts mostly specific.	Ideas are presented but not particularly developed or supported.	Content is not sound	Not attended	CO1, CO2, CO5
2	Organization 50%	Includes title, introduction, statement of the main idea with illustration and conclusion.	Includes title, introduction, statement of main idea and conclusion.	organizational tools are weak or missing	No organization	Not attended	CO1, CO2, CO5

i. Model Question Paper

Experiments with questions 10x 5 = 50			
1	Identification of mosquito spp	Identify	Recognize
2	Isolation and estimation of DNA from wild mosquitoes for bar coding	Asses	Skill
3	Isolation and estimation of RNA from wild mosquitoes	Asses	Skill
4	Principles of real time PCR? Demonstration of recombinant protein 56 of scrub typhus in SDS-PAGE	Explain	Skill
5	Dissection of mid gut in mosquitoes spp	Identify	Skill

Semester III

SEMESTER - III					
Course Code	Course Name	L	T	P	Credits
EPH-S3-11	Molecular Epidemiology	2	1	0	3

a. Course Outcome (CO)

On the successful completion of the course, the student will be able to

	Course Outcome	Level
CO 1	To understand the importance of bioinformatics and antimicrobial resistance in molecular epidemiology	Understand
CO 2	Identify application of molecular biology methods in epidemiology	Apply
CO 3	Critically analyse the application of molecular biology in defining determinants of disease	Analyse
CO 4	Devising prevention and control strategy for disease based on the outcome of Molecular epidemiology	Create
CO 5	Hands on experience on molecular biology and techniques	Skill

b. Syllabus

Units	Content	Hrs.
I	Introduction to Molecular Epidemiology Aim, scope and application of molecular epidemiology; Understanding the concept of genes, Single nucleotide polymorphisms and genomes of pathogens, Plasmids, Transposons and Pathogenicity islands; Reproduction number (R0); Infectious dose; Introduction to transcriptomics and Molecular phylogeny; Basics of transmission dynamics; Case study: John Snow's outbreak investigation of the cholera epidemic in London, The <i>E. coli</i> O104:H4 outbreak in Germany	12
II	Genotyping methods in Molecular Epidemiology Concept of genomics and its application in molecular epidemiology; Serotyping; Variable-number tandem repeat (VNTR) typing; Pulsed field gel electrophoresis (PFGE) typing; Multi-locus sequence typing (MLST); Whole genome sequencing; Sequencing techniques- Sanger sequencing, Next-Generation Sequencing (NGS), Illumina sequencing, Shot-gun sequencing, Pyro sequencing, Nanopore sequencing and Mass spectrometry; Construction of DNA libraries	12
III	Bioinformatics in Molecular Epidemiology Introduction to bioinformatics and computational biology; DNA, Protein, Metabolic pathways and small molecule databases; Data retrieval using NCBI, UniProt and EuPathDB; Different file formats in bioinformatics; Understanding sequence alignment: BLAST, CLUSTAL-Ω as tools of multiple, and pairwise, local and global sequence alignment, Similarity and identity of genetic sequences;	12

	Introduction to molecular phylogeny and its application in outbreak investigations; Construction of phylogenetic trees; Understanding nodes, branches, roots and clades in a tree; Types of phylogenetic trees; Models used in phylogenetic analysis; Construction of phylogenetic tree using MEGA-X software; Case study on infection forensics; Case study on hospital outbreak of MRSA	
IV	<p>Anti-Microbial Resistance and its Mechanism</p> <p>Antimicrobial resistance (AMR); Multi drug resistance (MDR); Antimicrobial susceptibility testing (AST); Rationale use of antibiotics; Decreasing antibiotic pipeline; Mechanisms of drug resistance in pathogens (intrinsic vs. acquired, horizontal and vertical gene transfer); Role of genomics in detection of AMR</p>	12
	<p>Tasks and Assignments:</p> <p>Each student is required to submit the following:</p> <ul style="list-style-type: none"> ✓ Case study regarding the molecular epidemiological study on One Health perspective ✓ Case study regarding AMR and determinants of AMR <p>References:</p> <ol style="list-style-type: none"> 1. Pevsner J. (2009). Bioinformatics and Functional Genomics, II Edition, Wiley Blackwell 2. David W. Mount. Bioinformatics: Sequence and Genome Analysis, Cold Spring Harbour Laboratory Press 3. De Robertis EDP and De Robertis EMF (2006) Cell and Molecular Biology, 8th edition. Lippincott Williams and Wilkins, Philadelphia 4. Karp G (2010) Cell and Molecular Biology: Concepts and Experiments, 6th edition, John Wiley & Sons. Inc. 5. Glick, B.R. and Pasternak, J.J. (2009). Molecular Biotechnology - Principles and Applications of Recombinant DNA. IV Edition, ASM press, Washington, USA. 6. Walker J. and Raply R. (2009). Molecular Biology and Biotechnology. V Edition, Published by the Royal Society of Chemistry. 7. Bacterial Genomes: Disease Outbreaks and Antimicrobial Resistance is a freely available 3 week online course developed by Wellcome Genome Campus. It gives important insights, which are essential for students pursuing Epidemiology. The students can enrol for the course with the link provided below. The course is offered on Future Learn. <p>https://www.futurelearn.com/courses/introduction-to-bacterial-genomics</p>	

c. Mapping of Program Outcomes with Course Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	2	2	1	3	2
CO5	1	1	1	1	2

d. Evaluation Scheme

	CO1	CO2	CO3	CO4	CO5	Total
Internal	10	10	5	5	10	40
External	12	12	12	12	12	60
Total	22	22	17	17	22	100

e. Mapping Course Outcome with Internal Assessment (40 Marks)

	CO1	CO2	CO3	CO4	CO5
Assignments	5	5	-	-	5
Test	5	5	5	5	5
Total	10	10	5	5	10

f. Mapping Course Outcome with External Assessment (60 Marks)

Category	CO1	CO2	CO3	CO4	CO5
Part – A (Objective - 10 x 1 = 10 marks)	2	2	2	2	2
Part – B (Short Answer - 5 x 10= 50 marks)	10	10	10	10	10-
Total	12	12	12	12	12

g. Rubric for Assignments

Sl. No.	Criteria	100%	75%	50%	25%	0%	Relation to COs
1	Content 50%	Ideas are detailed, well developed, supported with specific evidence & facts and examples	Ideas are detailed, Developed and supported with evidence and facts mostly specific.	Ideas are presented but not particularly developed or supported.	Content is not sound	Not attended	CO1, CO2, CO5
2	Organization 50%	Includes title, introduction, statement of the main idea with illustration and conclusion.	Includes title, introduction, statement of main idea and conclusion.	organizational tools are weak or missing	No organization	Not attended	CO1, CO2, CO5

i. Model Question Paper

Sl. No.	Model Questions	Specification	Level
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Part – A: Objective Type			
Multiple choice			
10 x 1 = 10			
1	Which of the following base is exclusively present in RNA A. Adenine B. Guanine C. Thiamine D. Uracil	Recognize	Remember
2	Transcription is carried out by A. DNA polymerase B. RNA polymerase C. DNA helicase D. DNase	Recall	Remember
3	DNA gyrase is involved in A. Transcription B. Translation C. Replication D. Splicing	Recognize	Remember
4	Restriction fragment length polymorphism is used in A. Molecular biology B. Protein chemistry C. Organic chemistry D. All of the above	Recognize	Remember
5	In electrophoresis, DNA will migrate towards A. Anode B. Cathode C. Both of the above	Recognize	Remember
6	Splicing is associated with A. Replication B. Transcription C. Translation D. All of the above	Recognize	Remember
7	The sequential steps in a PCR are as follows A. Denaturation, extension, annealing B. Annealing, extension, denaturation C. Denaturation, annealing, extension D. Extension, annealing, denaturation	Recall	Remember
8	Translation occurs in A. Nucleus B. Nucleolus C. Cytoplasm D. Mitochondria	Recall	Remember
9	Hsp 60 is a protein involved in A. Protein folding B. Translation initiation C. Translation termination D. All of the above	Identify	Remember
10	The enzyme involved in amino acid activation is A. Aminoacyl mRNA synthetase B. Aminoacyl tRNA synthetase C. ATP synthase D. Aminoacyl rRNA synthetase	Identify	Remember
PART – B Long Answer			
The answer should not exceed 1500 words			
10x 5 = 50			
1	Discuss the role of several enzymes in DNA replication, transcription and translation	Explain	Understand
2	What is SNP? How SNPS are used in molecular epidemiology?		Understand

		Define	
3	Write the principles of Real time PCR and cloning	Define	Understand
4	Write in detail about prokaryotic expression and eukaryotic expression system	Illustrate	Understand
5	What is SDS PAGE ? How do we estimate the protein ?	Explain	Skill

SEMESTER - III					
Course Code	Course Name	L	T	P	Credits
EPH-S3-12	Research Methodology	1	2		3

Course Outcome (CO)

- On the successful completion of the course, the student will be able to

	Course Outcome	Level
CO 1	To understand research methodology, ethics and approaches to study public health issues	Understand
CO 2	To understand and apply relevant ethics framework for research	Apply
CO 3	Examine the relevance of appropriate designs in exploring / studying public health concerns	Analyse
CO 4	Integrating qualitative and quantitative methods ensuring rigor of work	Create
CO 5	Develop skills to develop a research proposal as well equip with appropriate analysis of data	Skill

Units	Content	Hrs.
I	Identifying the research question Review of literature (tools/databases for searching research articles e.g., Google Scholar, PubMed, ISI Web of Science, Biological Abstracts); Identification of a knowledge gap - a key step in research; Hypothesis driven research; Asking a valid/specific research question	12
II	Ethics and different approvals required for research Ethical guidelines in biomedical research: Declaration of Helsinki, Belmont report, CIOMS etc. Plagiarism; Different types of plagiarism in thesis writing; How to avoid plagiarism in thesis; Review of literature assignments to educate on plagiarism; Plagiarism software, Types of research approval committees: Institutional Human Ethics Committee (IHEC), Institutional Biosafety Committee, Institutional Animal Ethics Committee; Procedures and process of getting research approvals,	12
III	Data and experimental designs Designing a suitable approach/experiment to answer a question (development of a questionnaire, for example); Source of data: Primary and Secondary; Quantitative methodologies: Laboratory based research techniques, Field based research techniques, Research techniques that combine both laboratory and field; Important research methodologies in epidemiology and public health; Analysis of data (using Software Packages for Statistics); Metaanalysis; Qualitative research methodologies; Mixed methods that combine qualitative and quantitative research methodologies	12
IV	Thesis writing Components of a thesis: Abstract, Introduction, Materials and Methods, Results, Discussion and Future directions; How to write different	16

	sections of a thesis; Difference between thesis and a manuscript; Software packages for creating bibliography/references: Mendeley, EndNote etc.; Presentation of data; Drawing reasonable conclusions. Communication of research (via conference poster/paper presentation; publish an article in a journal). Preparation of posters and manuscripts. Impact Factor; H-index; i10-index.	
	<p>Tasks and Assignments:</p> <p>Each student is required to submit the following:</p> <ul style="list-style-type: none"> ✓ Development of an research article ✓ Usage of statistical software and analysis , interpretation of health data <p>References:</p> <ol style="list-style-type: none"> 1. Kulkarni, A. P. Research Methodology Power Publication, Calcutta 2. Bailey, S. & Handu, D. (2012). Introduction to Epidemiologic research methods in Public Health Practice, Published by Jones and Bartlett Publishers, 1st edition, 3. Marczyk, G., DeMatteo, D., & Festinger, D. (2005). Essentials of research design and methodology. John Wiley & Sons Inc. 4. Creswell, J. W., & Clark, V. L. P. (2007). Designing and conducting mixed methods research. 5. Health Research Methods – A Guide for Training in Research Methods, World Health Organization, Manila, 2001 	

Mapping of Program Outcomes with Course Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	3	2
CO2	2	3	3	3	3
CO3	2	3	3	3	3
CO4	2	2	1	3	2
CO5	1	2	3	1	2

d. Evaluation Scheme

	CO1	CO2	CO3	CO4	CO5	Total
Internal	10	10	5	5	10	40
External	12	12	12	12	12	60
Total	20	20	20	20	20	100

e. Mapping Course Outcome with Internal Assessment (40 Marks)

	CO1	CO2	CO3	CO4	CO5
Assignments	5	5	-	-	5
Test	5	5	5	5	5

Total	10	10	5	5	10
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f. Mapping Course Outcome with External Assessment (60 Marks)

Category	CO1	CO2	CO3	CO4	CO5
Part – A (Objective - 10 x 1 = 10 marks)	2	2	2	2	2
Part – B (Short Answer - 5 x 10 = 50 marks)	10	10	10	10	10-
Total	12	12	12	12	12

g. Rubric for Assignments

Sl. No.	Criteria	100%	75%	50%	25%	0%	Relation to COs
1	Content 50%	Ideas are detailed, well developed, supported with specific evidence & facts and examples	Ideas are detailed, Developed and supported with evidence and facts mostly specific.	Ideas are presented but not particularly developed or supported.	Content is not sound	Not attended	CO1, CO2, CO5
2	Organization 50%	Includes title, introduction, statement of the main idea with illustration and conclusion.	Includes title, introduction, statement of main idea and conclusion.	organizational tools are weak or missing	No organization	Not attended	CO1, CO2, CO5

Sl. No.	Model Questions	Specification	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	In probability sampling a) Population is finite b) Population is infinite b) Neither A nor B D) Both A and B	Recognize	Remember
2	Dependent variable can....? A) Vary B) Can be nominal or ordinal C) Both A and B D) Neither A nor B	Recall	Understand
3	In a symmetric distribution	Recognize	Remember

	<p>A) Mean>Median>Mode</p> <p>B) Mean=Median=Mode</p> <p>C) Mean>Mode>Median</p> <p>D) Mean<Mode<Median</p>		
4	<p>Declaration of Helkensi is related to</p> <p>a) Ethics b) research c) human rights d) primary health care</p>	Recognize	Remember
5	<p>What is the name of the conceptual framework in which the research is carried out?</p> <p>A) Research hypothesis</p> <p>B) Synopsis of Research</p> <p>C) Research paradigm</p> <p>D) Research design</p>	Recognize	Remember
6	<p>Which of the following features are considered as critical in qualitative research?</p> <p>A) Collecting data with the help of standardized research tools.</p> <p>B) Design sampling with probability sample techniques.</p> <p>C) Collecting data with bottom-up empirical evidence.</p> <p>D) Gathering data with top-down schematic evidence.</p>	Recognize	Remember
7	<p>Which one among the following statements is false in the context of participatory research?</p> <p>A) It recognizes knowledge as power</p> <p>B) It is a collective process of inquiry</p> <p>C) It emphasizes people as experts</p> <p>D) Its sole purpose is the production of knowledge</p>	Recall	Remember
8	<p>The main aim of the scientific method in the research field is to _____</p> <p>A) Improve data interpretation</p> <p>B) Confirm triangulation</p> <p>C) Introduce new variables</p>	Recall	Remember

	D) Eliminate spurious relations		
9	<p>Which one among the following is the most comprehensive source of population data?</p> <p>A) Census B) National Sample Surveys C) Demographic Health Surveys D) National Family Health Surveys</p>	Identify	Remember
10	<p>Which of the following is not the method of Research?</p> <p>A) Survey B) Historical C) Observation D) Philosophical</p>	Identify	Remember
	PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50		
21	Discuss the role of research methodology in planning appropriate public health interventions	Explain	Understand
22	a) Differentiate: interview method and observation as tools of data collection b) Define the following concepts- research ethics, sample, population	Differentiate Define	Understand
23	a) Give two examples wherein research ethics are in conflict with the organisational interests b) Give five shortcomings of poor research design	Cite Examples	Understand
24	Develop a research proposal to study sex-selective abortions in India. Develop a problem statement and provide an appropriate methodology to address the concerns.	Illustrate	Apply

SEMESTER - III					
Course Code	Course Name	L	T	P	Credits
EPH-S3-E3	Health Economics and Health Financing	1	2		3

- **Course Outcome (CO)**
- *On the successful completion of the course, the student will be able to*

	Course Outcome	Level
CO 1	To learn the about the key economic concepts	Understand
CO 2	To apply principles of economic evaluations in healthcare settings	Apply
CO 3	Examine and analyse the health financing strategies for Universal health coverage	Analyse
CO 4	Link appropriate health financing models to develop effective financial protection interventions	Create
CO 5	Develop health economic skills to critically evaluate health interventions and healthcare programs	Skill

b. Syllabus

Units	Content	Hrs.
I	Introduction of key economic concepts Demand, Supply, Production, Cost, Revenue, Efficiency, Equity, Elasticity, opportunity cost, supply and demand analysis	12
II	Principles and application of economic evaluation in health care Theoretical foundations of economic evaluation, concept and process of costing, types of economic evaluation in health care, New Econometric techniques and use of computer software in data analysis (WHO's One Health tool)	12
III	Healthcare financing and Universal Health Coverage Healthcare financing, concept, models and overview, Fundamentals of budgeting, Equity-Efficiency trade-off in healthcare, sustainability, Principles and axis of UHC, Making choices within scarce resources in Low and middle income countries.	12
IV	Healthcare markets and Healthcare negotiations Healthcare markets, Conditions under which normal markets and insurance markets work, market failure in health care, Healthcare negotiations- concepts, theories, process and strategies, essential Negotiations strategies for healthcare professional and Significance of individual and team negotiations. Pharmaceutical economics and policy: Pharmaceutical industries, brief overview, Public policy and its impacts on drugs and Trade policy and its impact on drug policy, licensing, patenting, TRIPS	16
	Tasks and Assignments: Each student is required to submit the following:	

	<ul style="list-style-type: none"> ✓ Case study on economic evaluations ✓ Seminar on Universal health coverage status in WHO-SEAR <p>References: Guinness, L. and Wiseman, V. (2011) Introduction to Health Economics (second edition) Open University Press. Gottret, P. E., & Schieber, G. (2006). <i>Health financing revisited: a practitioner's guide</i>. World Bank Publications. Morris S, Devlin N and Parkin D. (2007) Economic Analysis in Health Care, Chichester, Wiley Reidpath et al. (2011) The fallacy of the equity-efficiency trade off: rethinking the efficient health system. BMC Public Health, 12(Suppl 1):S3. http://www.biomedcentral.com/1471-2458/12/S1/S3 Olsen J. (2009) Principles in Health Economics and Policy, Oxford, Oxford University Press. McPake B, Normand C and Smith S. (2013) Health economics – an international perspective, (3rd Ed) Routledge, London. Folland S, Goodman AC and Stano M. (2013) The economics of health and health care, (7th Ed) Prentice Hall, Upper Saddle River, New Jersey. Palmer G and Ho M. (2008). Health Economics: a critical and global analysis. Palgrave MacMillan, New York.</p>	
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c. Mapping of Program Outcomes with Course Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	2	2	2	3	2
CO5	3	2	2	3	2

d. Evaluation Scheme

	CO1	CO2	CO3	CO4	CO5	Total
Internal	10	10	5	5	10	40
External	12	12	12	12	12	60
Total	20	20	20	20	20	100

e. Mapping Course Outcome with Internal Assessment (40 Marks)

	CO1	CO2	CO3	CO4	CO5
Assignments	5	5	-	-	5
Test	5	5	5	5	5
Total	10	10	5	5	10

f. Mapping Course Outcome with External Assessment (60 Marks)

Category	CO1	CO2	CO3	CO4	CO5
Part – A (Objective - 10 x 1 = 10 marks)	2	2	2	2	2
Part – B (Short Answer - 5 x 10 = 50 marks)	10	10	10	10	10-
Total	12	12	12	12	12

g. Rubric for Assignments

Sl. No.	Criteria	100%	75%	50%	25%	0%	Relation to COs
1	Content 50%	Ideas are detailed, well developed, supported with specific evidence & facts and examples	Ideas are detailed, Developed and supported with evidence and facts mostly specific.	Ideas are presented but not particularly developed or supported.	Content is not sound	Not attended	CO1, CO2, CO5
2	Organization 50%	Includes title, introduction, statement of the main idea with illustration and conclusion.	Includes title, introduction, statement of main idea and conclusion.	organizational tools are weak or missing	No organization	Not attended	CO1, CO3, CO4

Sl. No.	Model Questions	Specification	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	Co-payments are a) The initial expenses of a predetermined sum paid by insured b) Percentage of health care costs shared by insured c) Set rate of payment for prescriptions and doctor visits incurred by insured d) Predefined amount, or number of illnesses covered by insurance	Recognize	Remember
2	Interventions against supply-side moral hazard are.... (write all the applicable answers) - a. Risk rating	Recall	Remember

	<p>b. Waiting periods</p> <p>c. Capitation payment</p> <p>d. Gate-keeping</p>		
3	<p>Which statement/statements is/are correct about income elasticity of demand</p> <p>a. When $EI > 0$, i.e.the good is a “normal” good.</p> <p>b. When $EI > 1$, the good is a “luxury” good</p> <p>c. When $EI < 0$, i.e. the good is an “inferior” good.</p> <p>d. All of the above</p>	Recognize	Remember
4	<p>Drug provided by third party manufacturers despite the drug are still patented is called.....</p> <p>a. Counterfeit drug</p> <p>b. Copy drug</p> <p>c. Generic drug</p> <p>d. Brand-name drug</p>	Recognize	Remember
5	<p>Mark the correct statement</p> <p>a) Allocative Efficiency is meeting a given objective at least cost</p> <p>b) Technical Efficiency is producing the pattern of supply that matches the pattern of consumer demand</p> <p>c) Efficiency is maximizing benefit for resources used</p> <p>d) Economic efficiency is smallest input to get a stated output</p>	Recognize	Remember
6	<p>Horizontal equity is</p> <p>a) Unequal resources for unequal need</p> <p>b) The state of being the same</p> <p>c) Equal resources for equal need</p> <p>d) Differences in health status between individuals</p>	Recognize	Remember
7	<p>When income elasticity of demand is greater than 1, it is a.....good</p> <p>a) Normal</p> <p>b) Inferior</p> <p>c) Luxury</p> <p>d) None of the above</p>	Recall	Remember

8	<p>If the price of eye tests fell by 20% and the quantity of eye tests bought rose by 30%, the demand for eye test is</p> <p>a) price inelastic b) price elastic c) price flexible d) price efficient</p>	Recall	Remember
9	<p>Fall in price of substitute will</p> <p>a) Shift demand curve outward b) Shift supply curve outward c) Shift demand curve inward d) Both A and B</p>	Identify	Remember
10	<p>Demand for health insurance is a result of.....</p> <p>a) Uncertainty b) Illness c) Healthcare Professional d) Cost</p>	Identify	Remember
<p>PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50</p>			
21	<p>What is strategic purchasing? Name the common approaches to purchasing primary health care services around the world.</p>	Explain	Understand
22	<p>Define demand? Explain demand curve (with graph), movement along demand curve and shifting of demand curve</p>	Define Explain	Understand
23	<p>What is adverse selection and list out the possible solutions for minimizing adverse selection?</p>	Cite Examples	Understand
24	<p>What is Universal health coverage? Explain using UHC cube.</p>	Illustrate	Apply
27	<p>Assess the existing health insurance schemes in India using WHO health financing matrix.</p>	Assess	Skill

SEMESTER - III					
Course Code	Course Name	L	T	P	Credits
EPH-S3-E4	Nutrition and Health	2	1	0	3

a. Course Outcome (CO)

On the successful completion of the course, the student will be able to

	Course Outcome	Level
CO 1	To understand the role of nutrition on the health of the people. To understand the	Understand
CO 2	To apply the nutritional knowledge for identifying nutritional deficiency disorder and their management.	Apply
CO 3	Critically analyse the application of biology of nutrition for community health	Analyse
CO 4	Devising prevention and control strategy for disease based on the nutritional imbalances	Create
CO 5	Hands on experience on menu planning, food service delivery management	Skill

b. Syllabus

Units	Content	Hrs.
I	Overview of Public Health Nutrition Aim, scope and content of Public Health Nutrition, Role of Public Health Nutritionist in National development, Assessment of Nutritional Status of Individual and Community (Direct methods – anthropometry, biochemical, biophysical and clinical methods; Indirect methods – dietary intake and ecological variables including socio-cultural, biologic, environmental and economic), Errors in methods of assessing nutritional status.	12
II	Public Health Aspects of Nutrition Under nutrition aetiology, public health implications, preventive strategies for PEM/CED, Vitamin and essential elements deficiencies, Classification, predisposing factors, Diagnosis, Dietary management, diet counselling for Obesity, Hypertension, Coronary heart disease, Diabetes, Cancer, Musculo-skeletal, Rheumatic, Allergic disorders (Food), Gastrointestinal tract disorders, hepato biliary disorders, renal dysfunction. Dietary management in fevers and infections – Typhoid, Malaria and Tuberculosis Management of severely acute malnourished (SAM) children, inborn errors of metabolism: PKU, MSUD, galactosemia, tyrosinemia, Dental Caries	12
III	Concept of Community Nutrition	12

	<p>Nutritional problems confronting our country - Causes of mal nutrition in India,. Malnutrition & Infection, National and International agencies in community nutrition: ICDS, SNP, AMP, WHO, UNICEF, NIN, CFTRI, Nutrition Education: - Importance of nutrition education - Nutrition education methods: - Posters, Charts, Audio visual aids, lectures, Strategies to combat Nutritional problems – - Fortification, supplementation, Pediatric Nutrition Care and Management, Breast Feeding and its advantages: - Weaning foods - Importance of correct and timely weaning</p>	
IV	<p>Food Service Management</p> <p>Functions of management /manager, Principles of management, Definition of Organization and steps in organizing Menu planning: Importance of menu, Factors affecting menu planning, Menu construction, Types of menu, Menu card, Qualifications of a menu planner, Food Purchase: Purchasing methods – Market, Buyer, Vendor, Methods of Purchase: Formal and Informal, Purchasing procedure, Storage: Types of storage, Store room requirement, Appropriate temperature for storage of different foods, Storeroom Records, Standardization of recipes, Recipe adjustments and portion control Food delivery and service: Centralized and decentralized, factors affecting selection, Styles of service: self , table, tray equipment for delivery and service, Food recommended for use in canteens, Lunch rooms & Kiosks, Hospitals, Schools, Food Management - Characteristics of food - Sensory qualities - Nutritional qualities, Microbiological qualities, Food safety issues law and regulations</p>	12
	<p>Tasks and Assignments:</p> <p>Each student is required to submit the following:</p> <ul style="list-style-type: none"> ✓ Case study regarding menu planning for several disease and disorder ✓ Case study regarding food service management in hospitals and other clinical settings. <p>References:</p> <ol style="list-style-type: none"> 1. Mahan, L. K. and Escott Stump. S. (2008) Krause’s Food & Nutrition Therapy 12th ed. Saunders-Elsevier 2. Garrow, J.S., James, W.P.T. and Ralph, A. (2000) Human Nutrition and Dietetics. 10th ed. Churchill Livingstone 3. Koletzo B. (Ed) (2008) Pediatric Nutrition in Practice. Karger. 4. West B Bessie & Wood Levelle (1988) Food Service in Institutions 6th Edition Revised By Hargar FV, Shuggart SG, &Palgne Palacio June, Macmillian Publishing Company New York. 5. Sethi Mohini (2005) Institution Food Management New Age International Publishers 6. Koontz Harold &Weihrich Heinz (2006) Essentials of Management 7th edition Tata Mc Graw Hill Book Company. 7. Terrell E M (1971) Professional Food Preparation, Wiley publishers (New York) 8. Tripathi P C (2000) Personnel management 15th ed Sultan Chand, New Delhi 	

	9. World Cancer Research Fund & American Institute for Cancer Research (2007) Food, Nutrition, Physical Activity and the Prevention of Cancer A Global Perspective. Washington E.D. WCRF	
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c. Mapping of Program Outcomes with Course Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	2	2	1	3	2
CO5	1	1	1	1	2

d. Evaluation Scheme

	CO1	CO2	CO3	CO4	CO5	Total
Internal	10	10	5	5	10	40
External	12	12	12	12	12	60
Total	22	22	17	17	22	100

e. Mapping Course Outcome with Internal Assessment (40 Marks)

	CO1	CO2	CO3	CO4	CO5
Assignments	5	5	-	-	5
Test	5	5	5	5	5
Total	10	10	5	5	10

f. Mapping Course Outcome with External Assessment (60 Marks)

Category	CO1	CO2	CO3	CO4	CO5
Part – A (Objective - 10 x 1 = 10 marks)	2	2	2	2	2
Part – B (Short Answer - 5 x 10 = 50 marks)	10	10	10	10	10-
Total	12	12	12	12	12

g. Rubric for Assignments

Sl. No.	Criteria	100%	75%	50%	25%	0%	Relation to COs
1	Content 50%	Ideas are detailed, well developed, supported with specific evidence & facts and examples	Ideas are detailed, Developed and supported with evidence and facts mostly specific.	Ideas are presented but not particularly developed or supported.	Content is not sound	Not attended	CO1, CO2, CO5

2	Organization 50%	Includes title, introduction, statement of the main idea with illustration and conclusion.	Includes title, introduction, statement of main idea and conclusion.	organizational tools are weak or missing	No organization	Not attended	CO1, CO2, CO5
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i. Model Question Paper

Sl. No.	Model Questions	Specification	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	Arrange the selected foods given in ascending order of retinol content. (1) Egg, fish, butter, cheese (2) butter, fish, cheese, egg (3) Fish, egg, cheese, butter (4) cheese, egg, butter, fish	Recognize	Remember
2	Requirement of Iron for different age groups: List – I List - II (Group) (Iron in mg (daily needs)) (a) Adult Woman (i) 2.80 (b) Pregnant Woman (ii) 1.36 (c) Adolescent Boys (iii) 1.65 (d) Adolescent Girls (iv) 1.37 Code: (a) (b) (c) (d) (1) (iii) (i) (iv) (ii) (2) (ii) (iii) (i) (iv) (3) (i) (ii) (iii) (iv) (4) (iv) (i) (ii) (iii)	Recognize	Remember
3	Sequence in ascending order for percent content of essential fatty acids in cooking oils is : (1) Sunflower, Mustard, Soyabean, Groundnut (2) Mustard, Groundnut, Soyabean, Sunflower (3) Soyabean, Mustard, Groundnut, Sunflower (4) Groundnut, Mustard, Sunflower, Soyabean	Recognize	Remember
4	Content of MUFAs as percentage of total fatty acids in cooking oils in ascending order is: (1) Cotton seed oil, Corn oil, Sunflower oil, Safflower oil (2) Sunflower oil, Safflower oil, Corn oil, Cotton seed oil (3) Safflower oil, Sunflower oil, Cotton seed oil, Corn oil (4) Cotton seed oil, Sunflower oil, Safflower oil, Corn oil	Recognize	Remember
5	Which of the following milk has lactose content ? A. Goat B. Bovine milk C. Camel D. Human milk	Recall	Remember
6	Which of the following is true about exclusive breast-feeding? (a) Breast-feeding the infant and giving nothing by mouth till 6 months of age except vaccine and medicine. (b) Young infant should be given water in hot weather when the temperature crosses 42 °C. (c) Breast-feeding is not given when there is risk of diarrhoea. (d) No pre-lacteal feeds	Recognize	Remember

	Codes: (1) (a) and (b) (2) (b) & (c) (3) (c) & (d) (4) (d) & (a)		
7	(A) Vitamin 'D' is unique among vitamins as it is derived both from food and sunlight. (R) Vitamin 'D' deficiency leads to scurvy. (1) Both (A) and (R) are true and (R) is the correct explanation of (A). (2) Both (A) and (R) are true and (R) is not the correct explanation of (A). (3) (A) is true but (R) is false. (4) (A) is false but (R) is true.	Recall	Analyser
8	Which of the following has high Vitamin C content? A. Lemon B. Orange C. Both of the above D. Apple	Recognise	Remember
9	Which of the following milk is considered as good? A. SPC < 2 lakh B. SPC 2-10 lakhs C. SPC > 10 Lakhs D. SPC < 2.5 Lakhs	Identify	Remember
10	. DMC count of less than 5 lakhs is considered as A. Very good B. Good C. Fair D. Poor	Identify	Remember
	PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50		
21	What is community nutrition? Discuss in brief about formulation of food for renal disease patient?	Explain	Understand
22	a) Differentiate: stunting, low birth weight, undernutrition b. Explain PEM, SEM	Differentiate Define	Understand
23	What is phenylketonuria ? Diet formulation for cardiac diseases	Explain	Skill
24	What is HACCP? Quality control in food delivery system.	Define	Apply
27	What is FSSAI? Role of FSSAI in Food safety	Define	Apply

SEMESTER - III					
Course Code	Course Name	L	T	P	Credits
EPH-S3-P5	Anthropology of Health			2	2

a. Course Outcome (CO)

On the successful completion of the course, the student will be able to

	Course Outcome	Level
CO 1	To understand the basic knowledge of anthropology	Understand
CO 2	To apply the knowledge of anthropology for health sciences	Apply
CO 3	Analyse the age, sex and other forensic anthropological techniques	Analyse
CO 4	Create the virtual anthropological models	Create
CO 5	Hands on experience on human karyotyping and forensic anthropology	Skill

b. Syllabus

Units	Content	Hrs.
I	Anthropology, and basic measurements used to understand anthropology Anthropology, Anthropometry, Osteology, Somatometry, Craniometry, Somatoscopy, Instrument used, linear/ curvilinear measurement, Angles Indices, Assessment of Sex of Skull, Assessment of Age of Skull	12
II	Serology Serological assays	12
III	Basic understanding of forensic anthropology Human karyotyping, Dermatoglyphics	
	Tasks and Assignments: Each student is required to submit the following: <ul style="list-style-type: none"> ✓ Case study regarding systematic review of medical anthropology ✓ Case study regarding documenting the human karyotyping techniques being used in forensic anthropology in India and across the globe References: <ol style="list-style-type: none"> 1. Indera P. Singh and M.K. Bhasin: (1989) Anthropometry. Delhi, Kamla Raj Enterprises 2. M.K. Bhasin and S.M.S. Chahal: Manual of Human Blood Analysis (1996), Delhi, Kamla Raj Enterprises 3. Judith Hall, Judith Allanson, Karen Gripp, and Anne Slavotinek (2006) Handbook of Physical Measurements (Oxford Handbook) Oxford University Press, USA; 2 edition 4. Stanley J. Ulijaszek and C. G. Nicholas Mascie-Taylor (2005) Anthropometry: The Individual and the Population (Cambridge Studies in Biological and Evolutionary Anthropology) Cambridge University Press. 	

c. Mapping of Program Outcomes with Course Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	2	2	1	3	2
CO5	1	1	1	1	2

d. Evaluation Scheme

	CO1	CO2	CO3	CO4	CO5	Total
Internal	10	10	5	5	10	40
External	12	12	12	12	12	60
Total	22	22	17	17	22	100

e. Mapping Course Outcome with Internal Assessment (40 Marks)

	CO1	CO2	CO3	CO4	CO5
Assignments	5	5	-	-	5
Test	5	5	5	5	5
Total	10	10	5	5	10

f. Mapping Course Outcome with External Assessment (60 Marks)

Category	CO1	CO2	CO3	CO4	CO5
Viva and Practical record 10 marks	2	2	2	2	2
Part – B (Short Answer – 5X10 = 50 marks)	10	10	10	10	10-
Total	12	12	12	12	12

g. Rubric for Assignments

Sl. No.	Criteria	100%	75%	50%	25%	0%	Relation to COs
1	Content 50%	Ideas are detailed, well developed, supported with specific evidence & facts and examples	Ideas are detailed, Developed and supported with evidence and facts mostly specific.	Ideas are presented but not particularly developed or supported.	Content is not sound	Not attended	CO1, CO2, CO5
2	Organization 50%	Includes title, introduction, statement of the main idea with illustration and conclusion.	Includes title, introduction, statement of main idea and conclusion.	organizational tools are weak or missing	No organization	Not attended	CO1, CO2, CO5

i. Model Question Paper

Experiments and Question answers			
The answer should not exceed 1500 words 10x 5 = 50			
21	What are the basic measurements of anthropometry? Prepare a	Explain	Apply

	report of anthropometric survey in the community		
22	Anthropometry and Estimation of PEM	Define	Apply
23	Isolation of DNA for forensic anthropology	Explain	Skill
24	Principles of PCR	Explain	Apply
27	Principles of Somatometry	Explain	Apply

SEMESTER - III					
Course Code	Course Name	L	T	P	Credits
EPH-S3-P5	Laboratory Techniques in Food Safety			2	2

a. Course Outcome (CO)

On the successful completion of the course, the student will be able to

	Course Outcome	Level
CO 1	To understand the overview of food safety standard	Understand
CO 2	To apply the nutritional knowledge for identifying nutritional deficiency disorder and their management.	Apply
CO 3	Critically analyse the application of biology of nutrition for community health	Analyse
CO 4	Devising prevention and control strategy for disease based on the nutritional imbalances	Create
CO 5	Hands on experience on menu planning, food service delivery management	Skill

b. Syllabus

Units	Content	Hrs
I	Over view of food safety standards, codes Overview of Public Health Nutrition, Overview of Several Standards (FSSAI, BIS, CODEX, ICMSF) for food safety, Overview of HACCP.	12
II	Food Safety Lab Preparation and Basic Microbiological standards for Food Quality Assurance Collection and Dispatch of Food for Chemical and Microbiological Safety evaluation, Microbiological standards and quality control test (biological and other indicators of hygienic quality and spoilage) of foods	12
III	Techniques in detection of food borne hazards Detection and quantitation of food-borne pathogens, toxins, antibiotics, pesticides and additives in foods	12
IV	Practical on Food Service Management Visit to different Hospital facility, Anganwadi, Community Kitchen Formulating diet for fever, Obesity, cardiovascular diseases, hypertension, Diabetes, Gastrointestinal disorders patient	12

	<p>Tasks and Assignments:</p> <p>Each student is required to submit the following:</p> <ul style="list-style-type: none"> ✓ Case study regarding menu planning for several disease and disorder ✓ Case study regarding food service management in hospitals and other clinical settings. <p>References:</p> <ol style="list-style-type: none"> 1. Official Methods of Analysis of AOAC International (1995). 16th Edition. Edited by Patricia Cuniff. Published by AOAC International. Virginia. USA. Test No. 17.7.02 p. 48 – 50 2. Compendium of Methods for the Microbiological Examination of Foods. (1992) Carl Vanderzant and Don F. Splittstoesser. Eds. Washington D.C. p. 623 – 635 3. Bacteriological Analytical Manual (1992) 6th Edn. Arlington.V.A. Association of Official Analytical Chemists for FDA, WashingtonDC.p.209–214 4. https://www.dropbox.com/sh/tbui41uhigokz98/AAD3fJxJ2WlluBIO6lxHW8j4a?dl=0 <p>https://onlinecourses.nptel.ac.in/noc17_hs14.</p>	
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c. Mapping of Program Outcomes with Course Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	2	2	1	3	2
CO5	1	1	1	1	2

d. Evaluation Scheme

	CO1	CO2	CO3	CO4	CO5	Total
Internal	10	10	5	5	10	40
External	12	12	12	12	12	60
Total	22	22	17	17	22	100

e. Mapping Course Outcome with Internal Assessment (40 Marks)

	CO1	CO2	CO3	CO4	CO5
Assignments	5	5	-	-	5
Test	5	5	5	5	5
Total	10	10	5	5	10

f. Mapping Course Outcome with External Assessment (60 Marks)

Category	CO1	CO2	CO3	CO4	CO5
Part – A (Viva and Practical record 10 marks)	2	2	2	2	2
Part – B (Experiment and Question answer - 5 x 10 = 50 marks)	10	10	10	10	10-
Total	12	12	12	12	12

g. Rubric for Assignments

Sl. No.	Criteria	100%	75%	50%	25%	0%	Relation to COs
1	Content 50%	Ideas are detailed, well developed, supported with specific evidence & facts and examples	Ideas are detailed, Developed and supported with evidence and facts mostly specific.	Ideas are presented but not particularly developed or supported.	Content is not sound	Not attended	CO1, CO2, CO5
2	Organization 50%	Includes title, introduction, statement of the main idea with illustration and conclusion.	Includes title, introduction, statement of main idea and conclusion.	organizational tools are weak or missing	No organization	Not attended	CO1, CO2, CO5

i. Model Question Paper

PART – B Long Answer			
The answer should not exceed 1500 words 10x 5 = 50			
21	Report of visiting a community kitchen	Explain	Understand
22	Report on the diet formulation at tertiary care hospitals	Understand	Skill
23	Identification of food borne pathogens in milk/meat	Understand	Skill
24	Water / food quality monitoring by MPN method	Illustrate	Apply
27	ASSES antibiotic residue in food	Assess	Skill

SEMESTER - III					
Course Code	Course Name	L	T	P	Credits
EPH-S3-P7	Geospatial techniques in Epidemiology			2	2

a. Course Outcome (CO)

On the successful completion of the course, the student will be able to

	Course Outcome	Level
CO 1	To understand the basic biology of mosquito vectors involved in transmission of diseases	Understand
CO 2	To apply the knowledge of vector dynamics and behaviour to separate the mosquito species	Apply
CO 3	Analyse the several species mosquitoes and their blood meal pattern	Analyse
CO 4	Develop the green and eco-friendly techniques for mosquito control	Create
CO 5	Hands on experience on collection, handling, bioassays and dissections of mosquitoes	Skill

b. Syllabus

Units	Content	Hrs.
I	<p>Geospatial techniques and Public health Introduction to Geospatial Technologies- Principles of Remote sensing, Fundamentals of GIS and Basics of GNSS Data Models- Raster and Vector, Data input, data editing, Geodatabase, Geo-spatial data mapping, geo-visualization and data interpretation</p>	12
II	<p>Practice the usage of GIS Hands-on experience and laboratory exercises using ESRI software, Case studies: Visualization and exploration of patterns of disease in space and time Identification of risk factors of disease in space and time, including risk mapping Assessment of accessibility and availability to health facilities Spatial Decision Support system for public Health</p>	12
	<p>Tasks and Assignments: Each student is required to submit the following:</p> <ul style="list-style-type: none"> ✓ Case study regarding the use of GIS and spatio temporal epidemiology in India and across the globe ✓ Case study regarding documenting the locally available geo data for mapping the distribution of diseases. ✓ References: <ol style="list-style-type: none"> 1. Joseph, G. (2004): Fundamentals of Remote Sensing, Universities Press, Hyderabad, India 2. Lillesand, T. M., Kiefer, R. W. and Chipman, J. W. (2008): Remote Sensing and Image Interpretation, John Wiley & Sons, 	

	New Delhi	
	3. Gatrell, A. and Loytonen, 1998: GIS and Health, Taylor and Francis Ltd, London	
	4. Longley, P.A., Goodchild, M.F., Maguire, D.J. and Rhind, D.W., 2001, Geographic Information Systems and Science, Wiley, Chichester	
	5. Web resources, Journal Articles	

c. Mapping of Program Outcomes with Course Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	2	2	1	3	2
CO5	1	1	1	1	2

d. Evaluation Scheme

	CO1	CO2	CO3	CO4	CO5	Total
Internal	10	10	5	5	10	40
External	12	12	12	12	12	60
Total	22	22	17	17	22	100

e. Mapping Course Outcome with Internal Assessment (40 Marks)

	CO1	CO2	CO3	CO4	CO5
Assignments	5	5	-	-	5
Test	5	5	5	5	5
Total	10	10	5	5	10

f. Mapping Course Outcome with External Assessment (60 Marks)

Category	CO1	CO2	CO3	CO4	CO5
Viva 10 marks	2	2	2	2	2
Part – B (Long questions and experiments 5X10=50 marks)	10	10	10	10	10-
Total	12	12	12	12	12

g. Rubric for Assignments

Sl. No.	Criteria	100%	75%	50%	25%	0%	Relation to COs
1	Content 50%	Ideas are detailed, well developed, supported with specific evidence & facts and examples	Ideas are detailed, Developed and supported with evidence and facts mostly	Ideas are presented but not particularly developed or supported.	Content is not sound	Not attended	CO1, CO2, CO5

			specific.				
2	Organization 50%	Includes title, introduction, statement of the main idea with illustration and conclusion.	Includes title, introduction, statement of main idea and conclusion.	organizational tools are weak or missing	No organization	Not attended	CO1, CO2, CO5

i. Model Question Paper

Long Answer			
The answer should not exceed 1500 words 10x 5 = 50			
21	Usage of Arc GIS	Explain	Understand
22	Spatio temporal mapping of infectious diseases	Understand	Apply
23	Climatic variables and mapping of distribution of diseases	Cite Examples	Apply
24	Status of distribution of vectors and vector borne disease	Illustrate	Apply
27	Role of climate change and emergence of diseases with modeling	Assess	Skill

SEMESTER - III					
Course Code	Course Name	L	T	P	Credits
EPH-S3-P8	Techniques in Molecular Epidemiology			2	2

a. Course Outcome (CO)

On the successful completion of the course, the student will be able to

	Course Outcome	Level
CO 1	To understand the importance of bioinformatics and antimicrobial resistance in molecular epidemiology	Understand
CO 2	Identify application of molecular biology methods in epidemiology	Apply
CO 3	Critically analyse the application of molecular biology in defining determinants of disease	Analyse
CO 4	Standardising molecular protocols for epidemiological surveillance	Create
CO 5	Hands on experience on molecular biology techniques	Skill

b. Syllabus

Units	Content	Hrs.
I	Basic fundamentals of Bioinformatics Blast searches and sequence retrieval, Primer design, DNA sequencing Restriction fragment length polymorphism (RFLP) Sequence alignment (DNA/Protein), Phylogenetic tree construction and analysis	12
II	Practical on serological and DNA based techniques ELISA, PCR, Nested PCR, Multiplex PCR, Reverse Transcriptase-PCR, Real Time PCR, LAMP, Cloning	12
	Tasks and Assignments: Each student is required to submit the following: <ul style="list-style-type: none"> ✓ Case study regarding the molecular epidemiological study on One Health perspective ✓ Case study regarding AMR and determinants of AMR References: <ol style="list-style-type: none"> 1. Principles of Gene Manipulation and Genomics. S.B. Primrose and R.M. Twyman. 7th edition (2014) 2. Watson JD, Baker TA, Bell SP, Gann A, Levine M and Losick R (2008) Molecular Biology of the Gene, 6th edition, Cold Spring Harbour Lab. Press, Pearson Publication 3. De Robertis EDP and De Robertis EMF (2006) Cell and 	

1	Content 50%	Ideas are detailed, well developed, supported with specific evidence & facts and examples	Ideas are detailed, Developed and supported with evidence and facts mostly specific.	Ideas are presented but not particularly developed or supported.	Content is not sound	Not attended	CO1, CO2, CO5
2	Organization 50%	Includes title, introduction, statement of the main idea with illustration and conclusion.	Includes title, introduction, statement of main idea and conclusion.	organizational tools are weak or missing	No organization	Not attended	CO1, CO2, CO5

i. Model Question Paper

Experiments and Long Answer			
The answer should not exceed 1500 words 10x 5 = 50			
21	Principles and Methods of Indirect ELISA		Understand Explain
22	Methods of cell culture		Understand Skill
23	Methods of DNA isolation and estimation		Understand Apply
24	Methods of estimation urine/blood parameters of Cardiac disease using PCR		Asses Skill
27	PCR and Agravoe Gel electrophoresis		Assess Skill

SEMESTER - III					
Course Code	Course Name	L	T	P	Credits
EPH-S3-E5	Immunology	2	1	0	3

a. Course Outcome (CO)

On the successful completion of the course, the student will be able to

	Course Outcome	Level
CO 1	To understand the basic of immunology	Understand
CO 2	Identify application of immunological methods in epidemiology	Apply
CO 3	Critically analyse the application of immunology in defining pathogenesis and virulence of pathogen	Analyse
CO 4	Devising prevention and control strategy for disease based on the immunoresponse of hosts	Create
CO 5	Hands on experience on immunological techniques	Skill

b. Syllabus

Units	Content	Hrs.
I	An introduction to immune system Cells and organs of the immune system; Innate immunity - innate barriers to infectious agents, leukocytes recruitment to the sites of infection, pattern recognition receptors, NK cell-mediated cytotoxicity; Adaptive immunity - the role of innate immunity in T cell stimulation, benefits of secondary immune responses, immunological memory including major cell types, the signals required for lymphocyte activation and differentiation; Antigens, antibodies, antigen recognition capability; Tolerance to self-antigens; Structure and function of immunoglobulins; Monoclonal antibodies; B and T cell receptors; Antigen-antibody interactions	12
II	Immunoglobulin and T-cell receptor genes Organization of Ig gene loci; Molecular mechanisms of generation of antibody diversity; Expression of Ig genes; Regulation of Ig gene transcription; Antibody engineering; Organization of TCR gene loci; Generation of TCR diversity; Organization of HLA complex; Structure of class I and II HLA molecules; Expression of HLA genes; HLA polymorphism	12
III	Generation and regulation of immune responses Antigen processing and presentation; MHC-restriction; Cytokines and activation of T and B cells; Clonal selection and immunological memory; Complement system; Regulation of immune responses; Immunological tolerance	12
IV	Disorders of Human Immune System Primary and secondary immunodeficiency; Autoimmune disorders and role of MHC in disease susceptibility; Hypersensitive reactions;	12

	Cytokine-related diseases; Tumor immunity; Vaccines; Transplantation immunology, immunology of important infectious diseases	
	<p>Tasks and Assignments:</p> <p>Each student is required to submit the following:</p> <ul style="list-style-type: none"> ✓ Case study regarding the usage of immunology for One Health perspective ✓ Case study regarding the role immunosystem pathogens and host interaction <p>References:</p> <ol style="list-style-type: none"> 1. Kuby Immunology, 6th edition - Textbook by Barbara A. Osborne, Thomas J. Kindt and Janis Kuby. 2. Prescott's Microbiology – 7th edition - By Joanne Willey and Linda Sherwood and Christopher J. Woolverton. McGraw Hill publication. 3. Roitt's Essential Immunology, 13th edition - Peter J. Delves, Seamus J. Martin, Dennis R. Burton, Ivan M. Roitt - Wiley Blackwell publication. 	

c. Mapping of Program Outcomes with Course Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	2	2	1	3	2
CO5	1	1	1	1	2

d. Evaluation Scheme

	CO1	CO2	CO3	CO4	CO5	Total
Internal	10	10	5	5	10	40
External	12	12	12	12	12	60
Total	22	22	17	17	22	100

e. Mapping Course Outcome with Internal Assessment (40 Marks)

	CO1	CO2	CO3	CO4	CO5
Assignments	5	5	-	-	5
Test	5	5	5	5	5
Total	10	10	5	5	10

f. Mapping Course Outcome with External Assessment (60 Marks)

Category	CO1	CO2	CO3	CO4	CO5
Part – A (Objective - 10 x 1 = 10 marks)	2	2	2	2	2
Part – B (Short Answer - 5 x 4 = 20 marks)	10	10	10	10	10-
Total	12	12	12	12	12

g. Rubric for Assignments

Sl. No.	Criteria	100%	75%	50%	25%	0%	Relation to COs
1	Content 50%	Ideas are detailed, well developed, supported with specific evidence & facts and examples	Ideas are detailed, Developed and supported with evidence and facts mostly specific.	Ideas are presented but not particularly developed or supported.	Content is not sound	Not attended	CO1, CO2, CO5
2	Organization 50%	Includes title, introduction, statement of the main idea with illustration and conclusion.	Includes title, introduction, statement of main idea and conclusion.	organizational tools are weak or missing	No organization	Not attended	CO1, CO2, CO5

SEMESTER - III					
Course Code	Course Name	L	T	P	Credits
EPH-S3-E6	Intersectionality in Health and development	1	2		3

- **Course Outcome (CO)**
- *On the successful completion of the course, the student will be able to*

	Course Outcome	Level
CO 1	To learn the about the social determinants of health and concept of intersectionality	Understand
CO 2	To apply principles of intersectionality in healthcare settings	Apply
CO 3	Examine and analyse the dimensions of inequity in health	Analyse
CO 4	Link appropriate social determinants model to develop effective interventions to reduce inequity	Create
CO 5	Develop intersctional analytical skills to critically evaluate health status and healthcare programs	Skill

b. Syllabus

Units	Content	Hrs.
I	Introduction to Health and Development Frameworks on social determinants of health, inter linkages between health and development, application in health program planning.	12
II	Equity in Health and Indicator Development Health equity, sources of inequalities, Concepts of indicators development, globalization and poverty, Health Impact Assessment (HIA), Impact of development policies on health	12
III	Intersectionality as a theory and a method Concept and practice of intersectionality, identifying the elements of gender, health systems and political economy as contributing factors that affect health outcomes, applying intersectionality lens to health systems	12
IV	Analytical framework for intersectionality research Key concepts and analytical approaches in intersectionality, forms, processes and outcomes of intersecting relations of power in health, Health Policy and System Research through intersectionality lens.	12
	Tasks and Assignments: Each student is required to submit the following: <ul style="list-style-type: none"> ✓ Case study on intersectionality ✓ Seminar on current research in the field of gender, caste and class in India with intersectionality lens 	

	<p style="text-align: center;">References:</p> <ol style="list-style-type: none"> 1. Sen, G., & Iyer, A. (2019). Beyond economic barriers: Intersectionality and health policy in low-and middle-income countries. In O. Hankivsky & J. S. Jordan-Zachery (Eds.), <i>The Palgrave Handbook of Intersectionality in Public Policy</i> (pp. 245-261). Cham, Switzerland: Palgrave Macmillan. 2. Mburu, G., Ram, M., Siu, G., Bitira, D., Skovdal, M., & Holland, P. (2014). Intersectionality of HIV stigma and masculinity in eastern Uganda: Implications for involving men in HIV programs. <i>BMC Public Health</i>, 14(1), 1061. 3. Bornemisza, O., Ranson, M. K., Poletti, T. M., & Sondorp, E. (2010). Promoting health equity in conflict-affected fragile states. <i>Social science & medicine</i>, 70 (1), 80-88. 4. Sen, G., George, A., & Östlin, P. (Eds.). (2002). <i>Engendering international health: the challenge of equity</i>. MIT Press. 5. Chattopadhyay, S. (2018). The shifting axes of marginalities: the politics of identities shaping women's experiences during childbirth in Northeast India. <i>Reproductive health matters</i>, 26(53), 62-69. 6. Hankivsky, Olena (2014) <i>Intersectionality 101</i>, Vancouver: The Institute for Intersectionality Research & Policy, Simon Fraser University 7. Larson, E., George, A., Morgan, R., & Poteat, T. (2016). 10 Best resources on... intersectionality with an emphasis on low-and middle-income countries. <i>Health policy and planning</i>, 31(8), 964-969. DOI: https://doi.org/10.1093/heapol/czw020 8. Sen, G., & Iyer, A. (2012). Who gains, who loses and how: leveraging gender and class intersections to secure health entitlements. <i>Social science & medicine</i>, 74(11), 1802-1811. 	
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c. Mapping of Program Outcomes with Course Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	2	2	2	3	2
CO5	3	2	2	3	2

d. Evaluation Scheme

	CO1	CO2	CO3	CO4	CO5	Total
Internal	10	10	5	5	10	40
External	12	12	12	12	12	60
Total	20	20	20	20	20	100

e. Mapping Course Outcome with Internal Assessment (40 Marks)

	CO1	CO2	CO3	CO4	CO5
Assignments	5	5	-	-	5
Test	5	5	5	5	5
Total	10	10	5	5	10

f. Mapping Course Outcome with External Assessment (60 Marks)

Category	CO1	CO2	CO3	CO4	CO5
Part – A (Objective - 10 x 1 = 10 marks)	2	2	2	2	2
Part – B (Short Answer - 5 x 10 = 50 marks)	10	10	10	10	10-
Total	12	12	12	12	12

g. Rubric for Assignments

Sl. No.	Criteria	100%	75%	50%	25%	0%	Relation to COs
1	Content 50%	Ideas are detailed, well developed, supported with specific evidence & facts and examples	Ideas are detailed, Developed and supported with evidence and facts mostly specific.	Ideas are presented but not particularly developed or supported.	Content is not sound	Not attended	CO1, CO2, CO5
2	Organization 50%	Includes title, introduction, statement of the main idea with illustration and conclusion.	Includes title, introduction, statement of main idea and conclusion.	organizational tools are weak or missing	No organization	Not attended	CO1, CO3, CO4

Sl. No.	Model Questions	Specification	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	Higher maternal mortality among aged women is an example of..... a) Health inequity	Recognize	Remember

	<ul style="list-style-type: none"> b) Health inequality c) Health difference d) All of the above 		
2	<p>An indicator is a rate or proportion when the numerator isin the population defined by the denominator</p> <ul style="list-style-type: none"> a) Included b) Excluded c) Added d) Divided 	Recall	Remember
3	<p>Number of deaths in children between 1 year and 4 years per 1000 children is</p> <ul style="list-style-type: none"> a) Infant mortality rate b) Child mortality rate c) Child morbidity rate d) Under-5 morbidity rate 	Recognize	Remember
4	<p>Structure of society or the social relations in society which create social stratification and assign individuals to different social position is called.....</p> <ul style="list-style-type: none"> a) Social stratification b) Social context c) Social position d) All of the above 	Recognize	Remember
5	<p>The idea of Social Cohesion is used inapproach to Social Determinants of Health</p> <ul style="list-style-type: none"> a) Psychosocial Approach b) Social production of disease c) Political economy of health d) Ecosocial Approach 	Recognize	Remember
6	<p>Horizontal equity is</p> <ul style="list-style-type: none"> e) Unequal resources for unequal need f) The state of being the same g) Equal resources for equal need 	Recognize	Remember

	h) Differences in health status between individuals		
7	<p>The..... model suggests that factors that raise disease risk or promote good health may accumulate gradually over the life course, although there may be developmental periods when their effects have greater impact on later health than factors operating at other times.</p> <p>a) critical periods</p> <p>b) psychosocial model</p> <p>c) accumulation of risk</p> <p>d) life model</p>	Recall	Remember
8	<p>Political Economy of Health approach emphasizes the causes of ill health and not perceptions</p> <p>a) fundamental</p> <p>b) structural</p> <p>c) perspective</p> <p>d) none of the above</p>	Recall	Remember
9	<p>.....was established to support countries and global health partners to address the social factors leading to ill health and inequities.</p> <p>a) WHO</p> <p>b) WB</p> <p>c) UNICEF</p> <p>d) CSDH</p>	Identify	Remember
10	<p>The term “intersectionality” was coined inby American critical legal race scholar Kimberlé Williams Crenshaw</p> <p>a)1970</p> <p>b)1979</p> <p>c)1980</p> <p>d)1989</p>	Identify	Remember
	PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50		
21	What is Human Development Index (HDI) and how is it calculated?	Explain	Understand
22	Define and differentiate health inequality and health inequity	Define & differentiate	Understand
23	Define maternal mortality ratio and list at least two factors which can influence MMR.	Cite Examples	Understand

24	What are the three approaches to tackling health inequalities? List and explain.	Illustrate	Apply
27	<p>Using the intersectionality, design a study looking at the stigma associated with HIV in inter-state migrant labourers in Chennai. List three variables you are proposing to use.</p> <p>b) Based on the previous question, make a list of the intersecting dummy variables you are going to use for the study.</p>	Assess	Apply & Skill

EPH-S3-E7 Health Psychology

- **Course Outcome (CO)**
- *On the successful completion of the course, the student will be able to*

	Course Outcome	Level
CO 1	To learn health psychology models	Understand
CO 2	To apply basic psychological knowledge exploring public health issues	Apply
CO 3	Examine the role of behavioural determinants in health	Analyse
CO 4	Illustrate the role of counselling in health	Create
CO 5	Understand and suggest appropriate psychological intervention strategy to address various public health issues	Skill

Unit I. Health Psychology and its role in disease prevention, management

Health Psychology Concept, Assumptions, Models (Biomedical and Bio-psychosocial); Theories: Social Cognitive Theory, Theory of Planned Behaviour, Health Belief model, Protection – motivation theory, Trans – theoretical model of behaviour change, Self-regulatory model, latest trends. Interplay of psychological, biological, behavioural, and social factors (Biopsychosocial Model) in the study of health issues.

Unit-II: Behavioural determinants of health and diseases

Concepts, methods and models, Behavioural determinants and life style diseases, Behavioural modification, theories and methods. Patient/client center therapy, behavioural therapies, cognitive therapies, psycho-analytical approach.

Unit III. Role of Counselling in health

Definition; Concept; Scope; Characteristics of a Good Counsellor; Ethics in Counselling; Approaches to Counselling: Psychoanalysis; Behaviouristic; Humanistic; Cognitive; Application of Counselling: mental health set up; health care set up; Clinical set up Unit - I Types of Counselling: Individual Counselling; Group Counselling; Family Counselling.

Unit IV. Current Trends and challenges in Counselling in India

Diversity issues in counselling, Different formats of counselling. Counselling and liasoning fields. Trauma Counselling, Issues in Various fields like HIV/AIDS counselling, Genetic Counselling. Counselling Services in India. Professional Service related issues.

Learning outcomes

By the end of course students will have skill set to study the human nature and to develop inquisitiveness about the relationship between brain and behaviour, development, social Behaviour and personality and psychiatric disorders.

Suggested Readings

1. Ogden, J. (2012). Health Psychology. McCrawhill Foundation
2. Morrison, V., & Bennett, P. (2009). Introduction to Health Psychology (2nd Ed) Pearson Education Limited, New York.
3. Sarafino, E. P. (1994). Health Psychology, Biopsychosocial interactions. John Wiley & Sons, New York.
4. Hough, M. (2006). Counseling Skills and Theory. Hodder Arnold

4. Gladding, S.T. (2009). Counseling: A Comprehensive Profession. New Delhi: Pearson Education, Inc.
5. Taylor, S.E., (2009). Health Psychology (9th Ed). New Delhi: Tata McGraw-Hill Publishing Company Ltd.
6. Ayers, S., Baum, A., McManus, C., Newman, S., Wallston, K., Weinman, J., & West, R. (2007). Cambridge Handbook of Psychology, Health and Medicine (2nd Ed). Cambridge University Press
7. Brannon, L., McNeese, J. F., & Updegraff, J. A. (2014). Health Psychology an introduction to behavior and health (8th Ed). Delhi: Cengage Learning

Mapping of Program Outcomes with Course Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	3	2
CO2	2	3	3	3	3
CO3	2	3	3	3	3
CO4	2	2	1	3	2
CO5	1	2	3	1	2

d. Evaluation Scheme

	CO1	CO2	CO3	CO4	CO5	Total
Internal	10	10	5	5	10	40
External	12	12	12	12	12	60
Total	20	20	20	20	20	100

e. Mapping Course Outcome with Internal Assessment (40 Marks)

	CO1	CO2	CO3	CO4	CO5
Assignments	5	5	-	-	5
Test	5	5	5	5	5
Total	10	10	5	5	10

f. Mapping Course Outcome with External Assessment (60 Marks)

Category	CO1	CO2	CO3	CO4	CO5
Part – A (Objective - 10 x 1 = 10 marks)	2	2	2	2	2
Part – B (Short Answer - 5 x 10 = 50 marks)	10	10	10	10	10
Total	12	12	12	12	12

g. Rubric for Assignments

Sl. No.	Criteria	100%	75%	50%	25%	0%	Relation to COs
1	Content 50%	Ideas are detailed, well developed, supported with specific evidence & facts and examples	Ideas are detailed, Developed and supported with evidence and facts mostly	Ideas are presented but not particularly developed or supported.	Content is not sound	Not attended	CO1, CO2, CO5

			specific.				
2	Organization 50%	Includes title, introduction, statement of the main idea with illustration and conclusion.	Includes title, introduction, statement of main idea and conclusion.	organizational tools are weak or missing	No organization	Not attended	CO1, CO2, CO5

Sl. No.	Model Questions	Specification	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	Theory of planned behaviour was proposed by A) Ajzen B) bandura C) Koch D) Wilkinson	Recognize	Remember
2	Health belief model was first proposed in a) 1950s b)1970s C) 1990s D) 2000	Recall	Understand
3	The client centered therapy has the following assumption A) The therapist is congruent with the client. B) The therapist provides the client with unconditional positive regard. C) The therapist shows an empathetic understanding to the client. D) All the Above	Recognize	Remember
4	Having unmet needs disturb our hemostatic norm. This is assumption of a) Humanist Approach b) Cognitive Approach c) Both a and b d) Nether A nor B	Recognize	Remember
5proposed behaviourist approach A) Watson B) Pavlov C) Bandura D) Carl Rogers	Recognize	Remember
6	Which of the following features are considered as critical in Counselling?	Recognize	Remember

	a) Active Listening B) Non Judgmental Attitude C) Paraphrasing D) All the Above		
7	Which one among the following statements is false in the context of family counselling? A) All family members should be interviewed B) Information should be provided about one family member to another only with consent C) Family counsellor can advise the client D) All the Above	Recall	Remember
8	Psychoanalysis theory proposes that a) There are different levels of personality b) People use defence mechanisms c) Neither A nor B d) Both A and B	Recall	Remember
9	Which one among the following is the most comprehensive source of data about a client? A) Interviews B) Diaries and personal notes) letters D) All the above	Identify	Remember
10	Which of the following is not a principle of counselling? A) Non-Judgmental attitude B) Confidentiality C)Observation D) Acceptance	Identify	Remember
	PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50		
21	Discuss the role of behavioural determinants in palnning appropriate public health interventions	Explain	Understand
22	a) Differentiate: interview method and observation in counseling b) Define the following concepts- non-judgemental attitude, empathy and active listening	Differentiate Define	Understand
23	a) Give two examples wherein counselling ethics are in conflict with the organisational interests b) Give shortcomings of poorly planned counselling session	Cite Examples	Understand

Semester - IV

SEMESTER - I					
Course Code	Course Name	L	T	P	Credits
EPH-S4-18	Dissertation				10

a. Course Outcome (CO)

On the successful completion of the course, the student will be able to

	Course Outcome	Level
CO 1	To learn and understand research problem formulation, research questions and operational definitions	Understand
CO 2	To apply the scientific research methodology in conducting their own dissertation	Apply
CO 3	Examine their research problem with the help of qualitative/quantitative research tools with the help of statistical tests/ laboratory tests	Analyse
CO 4	Preparation of research questions, hypothesis, operational definitions and research tools for their dissertation	Create
CO 5	Scientific writing, article writing skills development and with proper communication of their research findings	Skill

b. Syllabus

Units	Dissertation outlines (6 months)
I	Development/finalization of the research synopsis Formulate statement of the research problem, research questions, hypothesis, significance of the research problems and operational definition.
II	Research Methodology Conduct an intensive scientific literature review and research synthesis. Develop detail research methods for conducting the study. For field based study to develop research tools, conduct the pilot study, pre-test the data and collection of data.
III	Data cleaning and analysis preparation Compilation of lab findings, if it is lab based research Data analysis and interpretation of both primary and secondary data
IV	Scientific writing Develop, chapter on main findings and discussion, summary and conclusion and
V	Research Communication and presentation Develop scholarly research paper for presentation and publication. Final dissertation work presentation
	Tasks and Assignments: Each student is required to submit the following: ✓ Seminar presentations on literature review and methodology

	✓ Final dissertation presentation
	<p>Dissertation format:</p> <p>Front cover page or title page- Dissertation title – short (length is 10-12 words); reflective of the content, problem, and the main variables to be studied; should be written in capital letters (annexure II).</p> <p>Student’s Name / Month and Year of Completion.</p> <p>Certificate (explaining that the work is original and not submitted/published elsewhere) - annexure III.</p> <p>Acknowledgements (of people who contributed to the shaping of your research report)</p> <p>Table of contents, List of Tables, List of Figures, List of abbreviation used and Preface</p>
	<p>Chapter (s)</p> <p>Abstract</p> <p>Introduction</p> <p>Review of literature,</p> <p>Research Methodology</p> <p>Result: Data analysis and interpretation</p> <p>Discussion</p> <p>Summary and Conclusion</p> <p>References</p> <p>While writing the references please follow the American Psychological Association (APA) format (http://library.flcc.edu/APA_FLCC.pdf). The student should be accurate with all the references. All citations in the text/content must be included in the reference section. All bibliographic references should alphabetically listed.</p> <p>Index (optional), Annexure, if any- for example research tool, a brief cases could be enclosed in annexure.</p>

c. Mapping of Program Outcomes with Course Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	2	2	2	3	3
CO5	3	3	2	2	3

d. Evaluation Scheme

	CO1	CO2	CO3	CO4	CO5	Total
Internal	5	10	10	10	15	50
External	10	5	10	10	15	50
Total	15	15	20	20	30	100

e. Mapping Course Outcome with Internal Assessment (50 Marks)

	CO1	CO2	CO3	CO4	CO5
Chapter submission	5	5	5	5	5

Seminar presentations	5	5	5	5	5
Total	10	10	10	10	10

f. Mapping Course Outcome with External Assessment (50 Marks)

Category	CO1	CO2	CO3	CO4	CO5
Final presentation	2	2	2	4	4
Final dissertation submission	5	5	5	5	6
Viva	2	2	2	2	2
Total	9	9	9	11	12

g. Rubric for seminar presentations

Sl. No.	Criteria	100%	75%	50%	25%	0%	Relation to Cos
1	Content 40%	Ideas are detailed, well developed, supported with specific evidence & facts and examples	Ideas are detailed, Developed and supported with evidence and facts mostly specific.	Ideas are presented but not particularly developed or supported.	Content is not sound	Not attended	CO1, CO2, CO5
2	Organization 40%	Includes title, introduction, statement of the main idea with illustration and Conclusion.	Includes title, introduction, statement of main idea and Conclusion.	Organizational tools are weak or missing	No organization	Not attended	CO1, CO2, CO5
3	Presentation and communication 20%	Dissertation is presented with proper research methodology and statistical analysis	Dissertation is presented with partially proper research methodology and statistical analysis	Dissertation is presented without proper research methodology and analysis	Poor presentation and communication skills	Not attended	CO1, CO2, CO5

h. Model Evaluation scheme for dissertation

Name of the student						
	100%	75%	50%	25%	0%	Total
Commitment to Research						
Technical skills:						
Communication/ Interpretation skills						
Lab discipline/ punctuality/work ethics:						
Independence in research:						

i. Model Viva Questions

Sl. No.	Model Viva Questions	Specification	Level
1	State your null and alternate hypothesis for your research topic?	Recognize	Remember
2	What are the steps used for selection and reporting of your literature review?	Recall	Remember
3	What is your dependent and independent variables?	Identify	Remember
4	State your operational definitions for the current study?	Differentiate Define	Understand
5	Which statistical tests have you used for your research topics and how did you select them?	Illustrate	Apply
6	What is the relevance of the selected topic? Justify with its public health relevance	Explain	Understand
7	What are your major research findings?	Assess	Skill
8	What are the major policy recommendations from your study?	Explain	Understand
9	What has your research added to the existing body of literature?	Explain	Understand
10	What are the strengths and limitations of your study?	Explain, Cite Examples	Understand