

DEPARTMENT OF EPIDEMIOLOGY AND PUBLIC HEALTH

CENTRAL UNIVERSITY OF TAMILNADU

THIRUVARUR



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

(2 Year Course, Semester Pattern)

Course Contents

2023-24

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 95 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 two 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 to the public regarding the knowledge they acquired
- 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 teamwork 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	P O 5
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

MSC EPH SYLLABUS 2023-24

SEMESTER-I						Marks	
Sl No.	Course Code	Course Title	Course types	Credits	Teaching Hours/Week	Internal	External
1	EPH2011	Principles and Practice of Public Health	Theory	4	4	40	60
2	EPH2012	Public Health Biology	Theory	4	4	40	60
3	EPH2013	Foundations of Epidemiology	Theory	4	4	40	60
4	EPH2014	Health care systems	Theory	4	4	40	60
5	EPH201P-1	Basic Laboratory Techniques in Epidemiology and Public Health Research	Practical	2	3		100
6	EPH201P-2	Basic Computer Applications in Public Health	Practical	2	3		100
7	EPH201-DSE 1*	Nutrition and Health / Health Communication	Theory	4	4	40	60
TOTAL				24	26		
SEMESTER II							
1	EPH2021	Biostatistics for Public Health	Theory	4	4	40	60
2	EPH2022	Epidemiology of infectious and or Communicable diseases of Public Health Importance	Theory	4	4	40	60
3	EPH2023	Epidemiology of Non-communicable diseases, injuries and chronic health problems	Theory	4	4	40	60
4	EPH2024	Internship/Field Visit/Training (During Vacation 1 st Semester)	Field training	4	4		100
5	EPH2023-OE	Open Elective	Theory	3	3	40	60
	EPH2025	Research Methodology	Theory	4	4	40	60
6	EPH202-VAC1	EPH201-VAC1 Value added Course-ArtificialIntelligence for Data Analysis	Skill training	2	2		100
TOTAL				23 (Excluding value added course)	21 (Excluding internship)		
SEMESTER III							
1	EPH2031	Methods in field epidemiology	Theory	4	4	40	60
2	EPH2032	Health Policies, Programs, Laws and Evaluation	Theory Theory	4	4	40	60
3	EPH2033	Health Economics and Financing	Theory	4	4	40	60

4	EPH203-DSE 2*	Gender and Population health / Reproductive and Sexual Health	Theory	4	4	40	60
5	EPH203-DSE3*	Environmental and Occupational Health/ Molecular Epidemiology	Theory	4	4	40	60
6	EPH203-P3	Advanced laboratory techniques in health research	Practical	2	3		100
7	EPH203-P4	Data analysis in Health Sciences using R software	Practical	2	3		100
TOTAL				24	28		
SEMESTER IV							
1	EPH2041	Research Project/Dissertation	Project Work	10			100
2	EPH204- DSE4	Public Health in Action	Theory	4	4	40	60
3	EPH204-P5	Practical's Study designs and operational research for public health	Practical	2	3		100
4	EPH204-P6	Practical Cross disciplinary approach for public health.	Practical	2	3		100
4	EPH204- SEC 1	Skill Enhancement Course Biostatistics using statistical softwares	Skill training	2	2		100
5	EPH2042	MOOC / SWAYAM/e_Patashala/NPT EL or Electives offered by departments/Self study	Online Courses	2	2		100
TOTAL				22	14(excluding dissertation)		

Grand Total: 93 credit hours (Excluding VAC)

***Students can choose any one of the courses of their choice**



Semester – I

SEMESTER - I					
Course Code	Course Name	L	T	P	Credits
EPH2011	Principles and Practice of Public Health	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 principles of public health discipline	Understand
CO 2	To apply appropriate health behavior models to understand health issues	Apply
CO 3	Examine the relevance of various institutions, and approaches in public health promotion	Analyse
CO 4	Link public health practice and approaches to develop effective health behavior interventions	Create
CO 5	Develop skills and exposure to core public health competencies	Skill

b. Syllabus

Units	Content	Hrs.
I	Public Health Concepts and Goals Public health, Health and its determinants, medicine vs public health, definition and history, Theoretical foundations and approaches of public health, Conceptual understanding of health, disease, illness and medicine, Review of modern public health, Evidence based health policy, History of the 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, 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 behavior 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	16
V	Public Health in a Global Context SDGs, Bilateral and Multilateral organizations and best practices, Role of international agencies and Aid: Role of WHO, WB, WTO; Impact of	

	GFATM, GAVI, PEPFAR, USAID, Public health ethics and future challenges in public health. Conceptual framework of one health	
	<p>Upon successful completion of the course, students will be able to:</p> <p>Tasks and Assignments:</p> <p>1. Narrate history of public health in the world and country context, 2. Discuss principles, various concepts of public and health, health promotion 3. Explain disease prevention strategies and methods and familiarize with competencies and 4. Be equipped with some basic skills in public health practice.</p> <p><u>Suggested Readings</u></p> <ol style="list-style-type: none"> 1. Schneider, M.J. (2016). Introduction to Public Health, 5th Ed. Jones & Bartlett Publishers. 2. Park and Park (2023). Text book preventive and social medicine. 27th Edition, Jabalpur, India: Banarsidas Bhanot. 3. Schneider, Mary- Jane (2013) Introduction to Public Health, 4 th ed. London: Jones and Bartlett. 4. Detel, Roger et al, Ed (2011). Oxford textbook of Public Health. 5 th ed. London. Oxford University Press. 5. Turnock, B.J. (2007). Essentials of Public Health -. Jones & Bartlett, Publishers. 6. Cohen J. (2006), The new world of global health. Science, 311: 162-167. 7. Kickbusch, I. (2005). “Tackling the Political Determinants of Global Health.” BMJ, 331,246-247. 8. Beaglehole, R and Bonita, R. (2002). Public Health at the Crossroads – Achievements and Prospects. 2nd Edition Cambridge University Press. 9. Detels, R., McEwen, J., Beaglehole, R. and Tanaka, H.(2002).Oxford textbook of Public Health Ed, 4th Edition, Oxford University Press (OUP). 10. Teutsch, S. M., & Churchill, R. E. (2000). Principles and practice of public health surveillance. Oxford University Press, USA. 11. Naidoo J, Wills J. Foundations for Health Promotion. 4th ed. London, England: Elsevier Health Sciences; 2016. 12. Emergencies Preparedness. Communicating risk in public health 	

	<p>emergencies: a WHO guideline for emergency risk communication (ERC) policy and practice. Who.int. World Health Organization; 2018.</p> <p>Available from: https://www.who.int/publications/i/item/9789241550208</p>	
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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 (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 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.	h. Model Questions	Specification	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	(A) Primary Health Care Approach was adopted by 134 countries inatConference (B) 1978, Alma-Ata Conference (C) B)1968, Alma-Ata Conference (D) 1978, Vienna Conference (E) 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	Germ theory was proposed and developed by (A) Virchow (B) Winslow (C) Robert Koch (D) Vesalius	Recognize	Remember
5	Nationalisation of health insurance is the feature ofcountry's health care system. (A) UK (B) India (C) Japan (D) Pakistan	Recognize	Remember

6	<p>..... are value-laden social judgements which possess a strong evaluative component</p> <p>A) Truths B) Attitudes C) Behaviour D) Knowledge</p>	Recognize	Remember
7	<p>(A) The Health Belief Model was Proposed by (B) Rogers (C) Rosenstock and Becker (D) Skinner and Adler (E) Bandura and Skinner</p>	Recall	Remember
8	<p>Bandura proposedtheory to explain human behaviour</p> <p>A) The social learning theory B) The diffusion theory C) Becker D) Hadley</p>	Recall	Remember
9	<p>.....generally attempts to predict the future health consequences—both positive and negative impacts—of an intervention such as a policy, programme, or project</p> <p>A) Health Impact Assessment B) Health Policy C) Health Investigation D) Outbreak Investigation</p>	Identify	Remember
10	<p>Public Health Preparedness aims at</p> <p>A) Mitigating the Problem B) Reducing the Impact C) Prepare for an Effective Response D) All the Above</p>	Identify	Remember
<p>PART – B Long Answer 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 behavior b) Define best practices of public health.</p>	Differentiate Define	Understand
13	<p>a) Give two examples of best practices in community health interventions 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
16	Explain various challenges in the field of public health in Indian context. As a public health expert, how do you propose to address them?	Assess	Apply

SEMESTER - I					
Course Code	Course Name	L	T	P	Credits
EPH2012	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; Basic Parasitology, Viruses - DNA and RNA viruses; Prions - human and animal prion diseases	12
IV	Human Anatomy and Physiology-I Musculoskeletal system, Blood -Composition and function; Plasma protein - Composition and function; Cardiovascular physiology, Cardiac cycle; Cardiac output; E.C.G; Blood pressure; 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	16
V	Human Anatomy and Physiology-II Neuro-Endocrine and reproductive Physiology: Overview of organization of nervous system; Effects of pituitary, thyroid, parathyroid, adrenal, pancreatic and reproductive hormones; Physiology of male and female	

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

h. Model Question Paper

Sl. No.	Model Questions	Specification	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	<p>Two or more polypeptide chain associating to form a subunit of protein</p> <p>(A) Primary structure (B) Secondary structure (C) Tertiary (D) None of the above</p>	Recognize	Remember
2	<p>Insulin is</p> <p>(A) A receptor (B) Hormone (C) Both of the above (D) None of the above</p>	Recall	Remember
3	<p>ATP is expended in</p> <p>(A) Simple diffusion (B) Facilitated transport (C) Active transport (D) Both B and C</p>	Recognize	Remember
4	<p>Mycelium is a feature in</p> <p>(A) Protista (B) Prions (C) Fungi (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> <p>(B) AGU</p> <p>(C) GUA</p> <p>(D) UGA</p>	Recall	Remember
9	<p>Diverticular disease is related to</p> <p>(A) Respiratory system</p> <p>(B) Endocrine system</p> <p>(C) Digestive system</p> <p>(D) Nervous system</p>	Identify	Remember

10	<p>Ring stage malaria parasites is</p> <p>(A) An asexual stage</p> <p>(B) A sexual stage</p> <p>(C) Both of the above</p> <p>(D) None 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	<p>Write short notes on</p> <p>A. Active transport</p> <p>B. Water is a polar molecule. Why?</p> <p>C. Bacteria as pathogens</p> <p>D. Classification of Bacteria</p>	Explain	Understand
2	<p>Write short notes on</p> <p>A. Prions</p> <p>B. Fungi</p> <p>C. Patterns of viral infections</p> <p>D. Function of proteins</p>	Define	Understand
3	<p>Give an overview of key organs and functions involved in digestive physiology, and highlight the major disease conditions that affect the digestive system</p>	Cite Examples	Understand
4	<p>Detail the different steps involved in the process of transcription in prokaryotes</p>	Illustrate	Apply
5	<p>Describe biomolecules in detail with adequate examples</p>	Explain	Cite examples

SEMESTER - I					
Course Code	Course Name	L	T	P	Credits
EPH2013	Foundations of Epidemiology	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 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	Analyze
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	<p>Introduction to Epidemiology</p> <p>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, Difference between infectious and communicable diseases vs. non-communicable diseases, 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.</p>	12
II	<p>Transmission dynamics and Natural history of diseases</p> <p>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, Measuring the occurrence of diseases (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 child mortality rates, proportional mortality rate, survival rate, calculation of adjusted and standardized prevalence and death rates, concept of DALYs), 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.</p>	12
III	<p>Epidemiological study designs</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, concept of analytical and experimental study, concepts of clinical epidemiology, field</p>	12

	epidemiology , Errors in epidemiology, confounding , adjustment of biases and confounders , Measures of association – Absolute risk, Relative risk, prevalence ratios, odds ratio, Measures of impact – Attributable risk, Population-attributable risk with real data examples	
IV	<p>Diseases Surveillance and screening</p> <p>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>	16
V	<p>Concepts in mathematical epidemiology</p> <p>Transmission dynamics model, SI, SIS, SIR models, Kermack-McKendrick threshold theorem, basic reproductive number(R_0), Factors affecting R_0, vaccine efficacy, effective reproduction number(R_t)</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 ✓ Case study on surveillance techniques ✓ Case study and analysis of health data for disease forecasting and modelling <p>References:</p> <ol style="list-style-type: none"> 1. David D Celentano, Moyses Szklo (2018). Gordis Epidemiology, 6th Edition. WB Sanders Co, Philadelphia 2. Merrill, R. M. (2015). Introduction to epidemiology. Jones & Bartlett Publishers. 3. Rothman, Kenneth; Lash, Timothy L. (2020). Modern Epidemiology, 4th Ed. Lippincott Williams & Wilkins (LWW) 4. Park K. (2023) .Parks text book of preventive & social medicine. 27th Edition, Jabalpur, India: Banarsidas Bhanot 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. 8. Fried, L. P., Borhani, N. O., Enright, P., Furberg, C. D., Gardin, J. M., Kronmal, R. A., ... & O'Leary, D. H. (1991). The cardiovascular health study: design and rationale. <i>Annals of epidemiology</i>, 1(3), 263-276. 9. Mackenbach, J. P., Kunst, A. E., Cavelaars, A. E., Groenhouf, F., Geurts, J. J., & EU Working Group on Socioeconomic Inequalities in Health. (1997). Socioeconomic inequalities in 	

<p>morbidity and mortality in Western Europe. <i>The lancet</i>, 349(9066), 1655-1659.</p> <p>10. Case, A., & Paxson, C. (2005). Sex differences in morbidity and mortality. <i>Demography</i>, 42(2), 189-214</p> <p>11. Schneider D, Lilienfeld DE. 2015. Lilienfeld's foundations of epidemiology. Oxford University Press</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 (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

h. 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
EPH2014	Health Care Systems	2	2		4

- **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 service development in India Introduction to Indian Healthcare system, Primary healthcare in India, Health service development in India, Major committees involved in healthcare service development in India.	12
IV	Healthcare infrastructure in India National Health mission, National Health Programs, National Health Policy, Recent reforms and challenges, Innovations and good practices in healthcare delivery	12
V	Health system research WHO framework for health system research, Tanahashi Framework, Evolution of global healthcare systems, philosophical perspectives of	12

health system research and ideas of “systems thinking”, siloed versus health system approach, types of health system research and challenges

Tasks and Assignments:

Each student is required to submit the following:

- ✓ Seminar presentation on healthcare systems of selected countries
- ✓ Report on major healthcare programs/schemes in India

References:

1. Gilson, L., Hanson, K., Sheikh, K., Agyepong, I. A., Ssengooba, F., & Bennett, S. (2011). Building the field of health policy and systems research: social science matters. *PLoS medicine*, 8(8), e1001079.
2. Sheikh, K., George, A., & Gilson, L. (2014). People-centred science: strengthening the practice of health policy and systems research. *Health Research Policy and Systems*, 12(1), 19.
3. Gilson, L., & World Health Organization. (2013). *Health policy and system research: A methodology reader: The abridged version*. World Health Organization.
4. Rice T, Rosenau P, Unruh LY, Barnes AJ, Saltman RB, van Ginneken E. United States of America: Health system review. *Health Systems in Transition*, 2013; 15(3):
5. Seán Boyle: United Kingdom (England): Health system review. *Health Systems in Transition*, 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. *International Journal of Health Services* 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. *Social Science and Medicine* 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? *Scandinavian Journal of Public Administration*, 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.
10. World Health Organization. (2007). Everybody's business--strengthening health systems to improve health outcomes: WHO's framework for action.
11. Lee, K., Kamradt-Scott, A. (2014). The multiple meanings of global health governance: a call for conceptual clarity. *Globalization and Health*, 10:28. <https://www.who.int>.
12. National Health Mission. [Home :: National Health Mission \(nhm.gov.in\)](http://nhm.gov.in)
13. Ministry of Health & Family Welfare Government of India (2019). Five years of NHM. [Final cover \(nhm.gov.in\)](http://nhm.gov.in)
14. MoHFW. Program guidelines. [Program Guidelines | Ministry of Health and Family Welfare | GOI \(mohfw.gov.in\)](http://mohfw.gov.in)
15. MoHFW (2021). Health And Family Welfare Statistics In India 2019-20. [HealthandFamilyWelfarestatisticsinIndia201920.pdf \(mohfw.gov.in\)](http://mohfw.gov.in)
16. MoHFW (2022). Rural Health Statistics 2020-21. main.mohfw.gov.in/sites/default/files/rhs20-21_1.pdf

	17. Kovner AR, McAlearney AS. (2013). Health Services Management : Cases, Readings, and Commentary. 10th edition. Health Administration Press.	
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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 = 500 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 and 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 B) UK C) France D) Cuba	Recognize	Remember
2	State whether the following statement is TRUE or FALSE " 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." A. True B. False	Recall	Remember
3 is an outcome/impact indicator according WHO performance measurement A. Access to care B. Quality of care C. Efficiency D. Patient satisfaction	Recognize	Remember
4	Which statement/statements is/are correct about vertical equity? A. People with similar needs to be treated similarly. B. People with dissimilar needs should be treated differently. C. Everyone should be treated same D. Increasing productivity while controlling cost E. All of the above	Recognize	Remember
5	Which statement/statements is/are correct about universal health coverage 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. B. Absence of geographical, sociocultural, or gender barriers that prevent all people from making use of comprehensive health services. C. Sufficient organizational mechanisms and financing to cover the entire population D. All people have access to the health services they need, when and where they need them, without financial hardship	Recognize	Remember
6	Select any two federal funded welfare/ insurance schemes in USA a) Mediclaim b) Medicare c) CHIP d) Veteran Health Care	Recognize	Remember
7	Commission on Social Determinants of Health was established in A) `1978 B)2000 C) 2005 D)2020	Recall	Remember
8	The Alma Ata Declaration was passed in A) 1948	Recall	Remember

	<p>B) 1978 C) 1998 D)2018</p>		
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> <p>a) Canada b) Japan c) USA d) Germany</p>	Identify	Remember
10	<p>Canada's Medicare is run bygovernment and ispayer system</p> <p>a) provincial, single b) territorial, multi-payer c) federal, single d) federal, multi-payer</p>	Identify	Remember
	<p>PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50</p>		
11	<p>What are the major managed healthcare plans in USA and how they differ from each other?</p>	Differentiate Define	Understand
12	<p>Explain the structure of rural healthcare system in India with the population norms at each level according to IPHS.</p>	Explain	Understand
13	<p>Explain major models or frameworks to measure the concept of coverage in healthcare system.</p>	Explain	Understand
14	<p>Draw and explain the WHO's Health system performance measurement matrix with inputs, outputs and outcomes.</p>	Illustrate	Apply
15	<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 b) Whether the healthcare system has responded to the need of the refugees? What are the services provided in the refugee camps? 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, I. list three specific outputs/process indicators for pregnant women (1 mark) II. list three specific outcome/impact indicators for children less than 5 years</p>	Assess	Apply Skill

SEMESTER - I					
Course Code	Course Name	L	T	P	Credits
EPH201P-1	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 microbiological 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	Create a frame work how to study the epidemiology of diseases by converging different lab findings	Create
CO 5	Hand on experience on basic bacteriology, physiology and Biochemistry and anthropometry	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	16
V	Basic Anthropometry Measurements Anthropometry, Osteology, Somatometry, Craniometry, Somatoscopy, Instrument used, linear/ curvilinear measurement	12
	Tasks and Assignments: Each student is required to submit the following: <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 References:	

	<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 8. Lab4Epi, ICMR-NIE https://www.dropbox.com/sh/tbui41uhigokz98/AAD3fJxJ2WlluBIO6lxHW8j4a?dl=0 (Accessed on July 2023)
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b. 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

c. 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

d. 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

e. 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

f. 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

h. 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 in anthropometric measurements	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
EPH201P-2	Basic Computer Applications in Public Health			2	2

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 basic computer applications	Understand
CO 2	Enable them to use the basic computer applications	Apply
CO 3	Enable them to use referencing software	Analyse
CO 4	Create spreadsheets, ppts and word documents	Create
CO 5	Develop computer application skills	Skill

b. Syllabus

Units	Content	Hrs.
I	Introduction to computers and operating systems Introduction to computers and operating systems, configure network settings in windows , operating task manager, file management, Installing basic software, use external devices on your desktop/laptop	8
II	Use of word processor Introduction to notepad, MS word, creating personal and professional documents such as CVs, letters, research proposals, educational documents by using MS Word	8
III	Use of spreadsheets Perform basic calculations in MS Excel, How to use formulas, functions, and charts in MS Excel, gantt chart, Table generation, histogram, box plot, bar diagram, scatter plot, pie chart.	8
IV	Use of MS Powerpoint Creating slides in a basic Powerpoint presentation, How to make your presentation attractive by inserting images, videos and graphics in your PPT, insert links of web pages and other hyperlinks, adding animations, creating rotating objects, and creating voice narration.	8
V	Tools for referencing and plagiarism checking Introduction to referencing software, Mendeley, Zotero and EndNote. Understand the consequences of plagiarism in the academic context and introduction to some free and paid plagiarism checking software.	8

	<p>Tasks and Assignments: Each student is required to submit the following: Record books weekly once Work report using MS word, Excel, Zotero</p> <p>References: 1. Yasnoff WA, O'Carroll PW, Koo D, Linkins RW, Kilbourne EM. Public health informatics: improving and transforming public health in the information age. J Public Health Manag Pract. 2000 Nov;6(6):67–75. [PubMed] [Google Scholar] 2. Markoff J. The New York Times. 2013. Dec 28, [2016-02-29]. Brainlike Computers, Learning From Experience http://www.nytimes.com/2013/12/29/science/brainlike-computers-learning-from-experience.html?_r=1 . 3. Stanton. J (2012). Introduction to Data Science. Syracuse University. 4. Das, S, R., & Das, S. (2016). Data science: theories, models, algorithms, and analytics. Learning, 143-145 5. Lacity, M. C., & Janson, M. A. (1994). Understanding qualitative data: A framework of text analysis methods. Journal of Management Information Systems, 11(2), 137-155. 6. IBM Corp Smarter Planet: The IBM 5 in 5. 2016. [2016-02-29]. http://www.ibm.com/smarterplanet/us/en/ibm_predictions_for_future/ideas/ 7. Saba, V.K. (1982). The Computer in Public Health: Today and Tomorrow. In: Saba, V.K., Rieder, K.A., Pocklington, D.B. (eds) Nursing and Computers. Computers and Medicine. Springer, New York, NY. https://doi.org/10.1007/978-1-4612-3622-1_14</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	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	8	8	8	8	8	40
Total	20	20	20	20	20	100

e. Mapping Course Outcome with Internal Assessment (60 Marks)

	CO1	CO2	CO3	CO4	CO5
Assignments	6	6	6	5	5

Practical test	6	6	6	6	6
Total	12	12	12	12	12

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%	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 and 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

h. Model Question Paper

Sl. No.	Model Questions	Specification	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	Which of these is not an example of First Generation computer? ENIAC Universal Automatic Computer PDP-8 EDSAC	Recognize	Remember
2	Which of these is not an example of Microcomputer? Personal Computer Laptop Tablet LAN	Recall	Remember
3	Name the storage device out of the given options	Recognize	Remember

	<p>Monitor CPU Magnetic Disk RAM SMPS</p>		
4	<p>Excel workbook is a collection of _____ and _____.</p> <p>Worksheet and charts Graphs and images Sheets and images Video and audio</p>	Recognize	Remember
5	<p>There is an option to add comments in an Excel worksheet, what are the cells called in which comments can be added?</p> <p>Cell Tip Comment Tip Smart Tip Point Tip Query Tip</p>	Identify	Remember
6	<p>Which of the following symbols needs to be added in the formula bar, before adding a formula?</p> <p>* \$ + =</p>	Analyse	Apply
7	<p>How can you activate a cell in MS Excel?</p> <p>By clicking on it By pressing the arrow keys By pressing Tab key All of the above</p>	Recall	Remember
8	<p>Header and Footer option is available under which of the following categories?</p> <p>Insert Design View Home</p>	Recall	Remember
9	<p>How many maximum slides can be added to a PowerPoint presentation?</p> <p>50 500 No fixed number 300</p>	Identify	Remember

10	To create a new paragraph in MS Word document, which of the following keyboard keys can be used? Enter Alt alt+@ Shift	Identify	Apply
PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50			
11	a) What is a Database? What are the components of the database management system? b)What are the types of the database management system?	Explain, differentiate	Understand
12	a)What are the commonly used referencing software?. What are the pros and cons of referencing software?	Differentiate Define	Understand
13	What are the advantages of using notepad over word pad?	Illustrate	Understand
14	List and explain at least 5 MS Office Applications & its Functions	Explain, Differentiate	Understand

EPH201DSE1 - Health Communication (4 credits)(L:2 T:2 P:0)

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 health education and communication	Understand
CO 2	To apply health communication concepts for public health	Apply
CO 3	To analyse the effect of different communication model, strategies for prevention and control of diseases	Analyse
CO 4	To develop research questions and BCC model for health research	Create
CO 5	Hands on experience on KAP and BCC model for communicable and non-communicable diseases research	Skill

Unit I: Health Communication:

types, need and significance, Mass media, definition, types, functions and significance to public health practice; Types of media, fundamentals of news media, role of news media in public health and soft skills for handling media, effective strategies for dealing with the media Health education and promotion, components, importance; Relevance of Information, Education and Communication (IEC) in public health. Health promotion in India, tools and programs for promotion of health status.

Unit II: Health education Core competencies:

Health behavior theories, models and frameworks, Use of health behavior theories in health education. Health education planning, implementation and evaluation; examples of effective strategies and barriers to success. Challenges to implement health education and prevention programmes. Health education responsibilities and competencies.

Unit III: Advocacy for public health:

Basic steps in dealing effectively with the communications aspect of an emergency situation in a public health setting, Communicate key scientific findings with policy makers.

Unit IV: Oral Scientific Communication:

Communication and change in health behavior- BCC- Behaviour change communication, KAP assessment through Focus group discussion, Interpersonal skills for effective communication – Interview and counselling- Role of health workers as counsellors, Steps in effective counselling. Effective Community Partnership – Methods to involve community partners – Chapatti Diagram, Relative Ranking, Village walk, Fish bowl technique. Science journalism; Working method of various media e.g. newspapers, special journals, radio, TV and web, Basics of journalistic communication, Scientific Interview technique.

Unit V: Written Scientific Communication:

Writing ability with a focus on formulation and layout, insight into editorial work, publication in a popular science forum. Written exercises, I) News item, II) Article and III) News item directed towards children. Editorial post with written and oral presentation. To write an article, Presentation techniques, reporting of scientific editorial posts.

References

Essential Readings

1. Berry D. Health communication: theory and practice. (2007). New York, NY: Open University Press,
2. Hornik, R. (Ed.). (2002). Public health communication: Evidence for behavior change. Routledge.
3. Backer, T. E., Rogers, E., & Sopory, P. (1992). Designing health Communication campaigns: What works? Sage Publications.
4. Kass-Hout, T. A., & Alhinnawi, H. (2013). Social media in public health. British medical bulletin, 108(1), 5-24.
5. WHO (2012). Health education; theoretical concepts, effective strategies and core competencies –. https://apps.who.int/iris/bitstream/handle/10665/119953/EMRPUB_2012_EN_1362.pdf?sequence=1&isAllowed=y
6. Claudia E Parvanta, David E Nelson, Sarah A Parvanta, Richard N Harner, (2011). Essentials of public health Communication – Jones and Bartlett Learning.
7. Teresa (Teri) L. Thompson (Editor). (2014). Encyclopedia of Health Communication ISBN: 9781452258751
8. Claudia E Parvanta and Sarah Bass (2018). Health Communication: Strategies and Skills for a New Era: Strategies and Skills for a New Era, Jones & Bartlett Learning
9. Marifran Mattson and Chervin Lam. (2015). Health Advocacy: A Communication Approach (Health Communication), Peter Lang Inc., International Academic

Tasks and Assignments:

Each student is required to submit the following:

- ✓ Devise KAP questionnaire for diseases of public health importance
- ✓ Case study on Community based BCC model for Communicable diseases / NCD prevention and control study

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 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 and 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	Didactic method of communication is also called as: (A) Lecture method (B) Two-way method (C) One-way method (D) Both (a) and (c)	Recognize	Remember
2	Socratic method of communication is also called as: (A) One-way communication (B) Two-way communication (C) Lecture method (D) Both (a) and (b)	Recall	Remember
3	Grapevine communication is also called as: (A) Informal communication (B) Formal communication (C) Neither formal or informal (D) None of the above	Recognize	Remember
4	Using Flannel graph as a method of health communication is a type of: (A) Group approach (B) Individual approach (C) Mass approach (D) None of the above	Recognize	Remember
5	Discussion group is an example of ----- pattern of communication. (A) Wheel (B) Chain (C) All-channel	Recognize	Remember

	(D) All		
6	----- is a series of speeches on the selected subject by experts. Panel discussion (A) Symposium (B) Lecture (C) Theatre (D) None	Recognize	Remember
7	----- is a teaching aid which consists of a series cards. (A) Flannel graph (B) Flash card (C) Booklet (D) None of these	Recall	Remember
8	In one-way communication there is no ----- (A) Feedback (B) Participation (C) Both (D) None	Recall	Remember
9	A communication barrier (A) Silence (B) Disinterest (C) Lack of sincerity (D) All	Identify	Remember
10	Audience remain as passive listeners inmethod (A) Group discussion (B) Role play (C) Panel discussion (D) Lecture	Identify	Remember
	PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50		
11	Explain components of communication and the Communication process.	Explain	Understand
12	a) Differentiate between panel discussion and group discussion. b) Define communication process. b) List out the major differences between IEC and BCC	Differentiate Define	Understand
13	Describe the barriers to communication and steps to overcome them. Give examples.	Cite Examples	Understand
14	Briefly explain feedback and its significance in health communication.	Illustrate	Apply
15	What is the significance of folk media in bringing behavioral change among rural community?	Assess	Skill

EPH201DSE1- Nutrition and Health (4 credits) (L: 2 T:2, P:0)**a. Course Outcome (CO)**

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

	Course Outcome	Level
CO 1	o understand the role of nutrition on the health of the people. o 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 balance	Create
CO 5	Hands on experience on nutritional survey	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 etiology, 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, hepatic 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 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	12
IV	Food Quality management Characteristics of food - Sensory qualities - Nutritional qualities, Microbiological qualities, Food safety issues law and regulations, Over view of food safety standards, codes Overview of Public Health Nutrition, Overview of Several Standards (FSSAI, BIS,	12

	CODEX, ICMSF) for food safety, Overview of HACCP	
V	Public health aspect of Food borne disease infection, intoxication, toxic infection, Food spoilage, food borne hazard mitigation	10
	<p>Tasks and Assignments:</p> <p>Each student is required to submit the following:</p> <ul style="list-style-type: none"> ✓ Case study regarding nutritional deficiency survey in India and critical analysis of methodology used and interpretation. ✓ Case study on Community based nutritional intervention study <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 	

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

h. Model Question Paper

Sl. No.	Model Questions	Specification	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	<p>Arrange the selected foods given in ascending order of retinol content.</p> <p>(1) Egg, fish, butter, cheese (2) butter, fish, cheese, egg (3) Fish, egg, cheese, butter (4) cheese, egg, butter, fish</p>	Recognize	Remember
2	<p>Requirement of Iron for different age groups:</p> <p>List – I List - II (Group) (Iron in mg (daily needs))</p> <p>(a) Adult Woman (i) 2.80 (b) Pregnant Woman (ii) 1.36 (c) Adolescent Boys (iii) 1.65 (d) Adolescent Girls (iv) 1.37</p> <p>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)</p>	Recognize	Remember
3	<p>Sequence in ascending order for percent content of essential fatty acids in cooking oils is :</p> <p>(1) Sunflower, Mustard, Soyabean, Groundnut (2) Mustard, Groundnut, Soyabean, Sunflower (3) Soyabean, Mustard, Groundnut, Sunflower (4) Groundnut, Mustard, Sunflower, Soyabean</p>	Recognize	Remember
4	<p>Content of MUFAs as percentage of total fatty acids in cooking oils in ascending order is:</p> <p>(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</p>	Recognize	Remember
5	<p>Which of the following milk has lactose content?</p> <p>A. Goat B. Bovine milk C. Camel D. Human milk</p>	Recall	Remember
6	<p>Which of the following is true about exclusive breast-feeding? Breast-feeding the infant and giving nothing by mouth till 6 months of age except vaccine and medicine.</p> <p>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</p>	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. Both (A) and (R) are true and (R) is the correct explanation of(A). Both (A) and (R) are true and (R) is not the correct explanationof (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, under nutrition 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 - II

SEMESTER - II					
Course Code	Course Name	L	T	P	Credits
EPH2021	Biostatistics for Public Health	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 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
IV	Hypothesis testing and sample size estimation 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 and power.	12

	Sample size estimation: Basic principles of sample size calculation, Sample size estimation in public health research	
V	<p>Type of statistical tests, Correlation and Regression</p> <p>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>	12
	<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. 14. Ahlbom, A. (1993). Biostatistics for epidemiologists. CRC Press 15. Du Prel, J. B., Hommel, G., Röhrig, B., & Blettner, M. (2009). Confidence interval or p-value? Part 4 of a series on evaluation of scientific publications. <i>Deutsches Ärzteblatt International</i>, 106(19), 335. 16. D'Agostino RB, Sullivan LM, Beiser AS, Sullivan LM, Sullivan LM (Lisa M. Introductory applied biostatistics. Australia ;: Thomson, Brooks/Cole; 2006. 	

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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

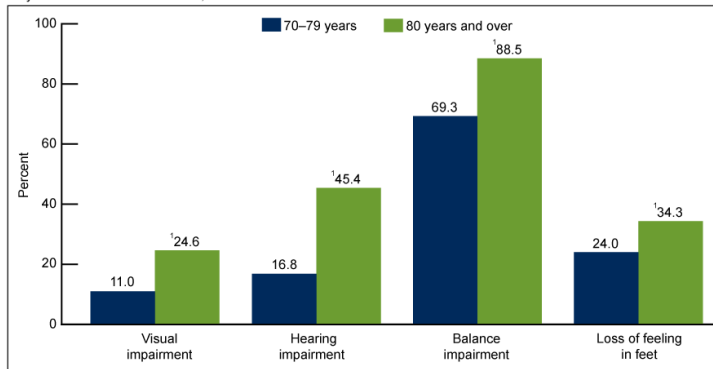
Sl. No.	Criteria	100%	75%	50%	25%	0%	Relation to COs
1	Content 50%	Detailed data tabulation with correct graphical representation, use of appropriate statistical tests and statistical interpretation of the	Data tabulation with less details, use of appropriate statistical tests without interpretation	Data tabulation without graphical representation, inappropriate statistical tests	Content is not sound	Not attended	CO1, CO4, CO5

		results					
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

h. 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

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>PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50</p>			
11	<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
12	<ul style="list-style-type: none"> a) Define “population” and “sample”. Why do we need sampling and 	Differentiate	Understand

	what are the different types of sampling techniques used in epidemiological studies?	Define	
13	What are the steps involved in deciding appropriate statistical method for research? List the statistical assumptions for parametric tests.	Illustrate	Understand
14	<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
15	<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

Course Code	Course Name	L	T	P	Credits
EPH2022	Epidemiology of infectious/Communicable diseases 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 diseases	Understand
CO 2	To apply the knowledge of typology, risk factors 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	To create emerging and reemerging diseases transmission dynamics models	Create
CO 5	Hands on experience on analyzing several health data, records on infectious diseases	Skill

b. Syllabus

Units	Content	Hrs.
I	Communicable diseases at glance Concept, CD typology, Risk factors for CDs, Epidemiology of CDs in India, burden of CD in India, Critical analysis of Global burden of infectious diseases, IDSP Weekly Outbreak Report, NFHS infectious diseases data , National TB surveillance Data, NVBDCP Data Public health interventions for CDs. Introduction to tropical diseases, Neglected tropical diseases, Emerging and re-emerging tropical diseases. Factors associated with disease emergence and forecasting of the disease	12
II	Epidemiology of infectious diseases including NTDs of Public health importance (CD) 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, Food poisoning, Cholera, Typhoid, Diphtheria Whooping Cough, Trachoma, Tetanus, Leprosy, Yaws, Amoebiasis, Ascariasis, Hookworm, Drucunculiasis	12
III	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. Climate change and its impact on VBDs.	12
IV	Epidemiology of Zoonotic diseases Viral Diseases: Rabies, KFD, Chikungunya, Yellow Fever, Japanese encephalitis; Bacterial	12

	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, One Health for Zoonotic disease.	
V	<p>Epidemiology of emerging and re-emerging diseases of Public health importance (CD)</p> <p>SARS and other Corona virus , Viral haemorrhagic fever, TBE, Nipah virus, West Nile virus, Monkey pox, emerging vector borne diseases, emerging fungal pathogens.</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 comparative epidemiological pattern of communicable and or infectious diseases in the developed, developing and underdeveloped countries ✓ Submit the assignment on emerging and reemerging diseases research status and pattern of research in India. <p>References:</p> <ol style="list-style-type: none"> 1. Cook, G. C., & Zumla, A. (2008). Manson's tropical diseases. Elsevier Health Sciences. 2. Global Burden of Disease Collaborative Network. Global Burden of Disease Study 2019 (GBD 2019) Disease and Injury Burden 1990-2019. 2020. https://doi.org/10.1016/S0140-6736(20)30925-9 3. Institute for Health Metrics and Evaluation. 2019. https://ghdx.healthdata.org/ Accessed 3 Jul 2023. 4. MoHFW. Program guidelines. Program Guidelines Ministry of Health and Family Welfare GOI (mohfw.gov.in) 5. MoHFW (2021). Health and Family Welfare Statistics in India 2019-20. HealthandFamilyWelfarestatisticsinIndia201920.pdf (mohfw.gov.in) 6. MoHFW (2022). Rural Health Statistics 2020-21. main.mohfw.gov.in/sites/default/files/rhs20-21_1.pdf 7. International Institute for Population Sciences. National Family Health Survey (NFHS-4) 2015-16 India. (2017). Available online at: http://rchiips.org/NFHS/NFHS-4Reports/India.pdf (accessed February 1, 2021). 8. International Institute for Population Sciences. National Family Health Survey (NFHS-5) 2019-21 India. (2022). Available online https://dhsprogram.com/pubs/pdf/FR375/FR375.pdf (Accessed on 15.06.23) 9. Central TB Division – Directorate General of Health Services Ministry of Health and Family Welfare Government of India. India TB report 2022, coming together to End TB Altogether. New Delhi, India; 2022. 10. National TB elimination programme Central TB Division. National TB Prevalence Survey in India 2019 - 2021. Ministry of Health and Family Welfare. 2021. 11. National Center for Vector Borne Diseases Control (NCVBDC) (2023) https://ncvbdc.mohfw.gov.in/index4.php?lang=1&level=0&linkid=407&lid=3683 12. Zoonotic Diseases of Public Health Importance. [Last accessed on July 23]. Available from: https://ncdcgovin/WriteReadData/1892s/File618pdf. 13. The FAO-OIE_WHO Collaboration Sharing Responsibilities and Coordinating Global Activities to Address Health Risk at the Animal – Human-Ecosystems Interfaces. 2010. [Last accessed on July 23]. Available from: https://www.who.int/influenza/resources/documents/tripartite_concept_note_hanoi_042011_en.pdf. 14. Planning Commission Working Group 3. Report of the Working Group on Disease Burden for the 12th Five-Year Plan: The Planning Commission, New Delhi: Planning Commission Working Group 3. 2010. [Last accessed on July 23]. Available from: 	

http://planningcommission.nic.in/aboutus/committee/wrkgrp12/health/WG_3_1communicable.pdf.

15. Technical Guidelines to States for Implementation of Various Components of Centrally Sponsored Scheme “Livestock Health and Disease Control” [Last accessed on July 23. Available from: http://dahdnicin/sites/default/files/technical_guidelines_0pdf .

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

	(D) <i>Anopheles sundaicus</i>		
6	<p>Most common cause of AES in India is</p> <p>(A) JE (B) Leptospirosis (C) Cerebral embolism (D) Dengue</p>	Recognize	Remember
7	<p>Rule of halves is applicable to</p> <p>(A) Meningitis (B) Filariasis (C) Malaria (D) Hypertension</p>	Recognize	Remember
8	<p>Pseudo membrane in the posterior pharynx is associated with</p> <p>(E) Mumps (F) Measles (G) Rubella (H) Diphtheria</p>	Recognize	Remember
9	<p>The epidemiological marker of Hepatitis B infection is</p> <p>(A) Hepatitis B envelope antigen (B) Hepatitis B core antigen (C) Hepatitis B surface antigen (D) None of the above</p>	Identify	Remember
10	<p><i>Bordetella pertussis</i> causes</p> <p>(A) Whooping cough (B) Diphtheria (C) Cerebral embolism (D) All of the above</p>	Identify	Remember
	<p>PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50</p>		
1	<p>Discuss the important features of the following diseases with respect to epidemiology, risk factors, pathogenesis, prevention and control of</p> <ul style="list-style-type: none"> • SARS Corona virus • 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	<p>Discuss the important features of the following diseases with respect to epidemiology, diagnosis, prevention and control.</p> <ul style="list-style-type: none"> • Kyasanur forest disease • Chikungunya 	Illustrate	Apply
5	<p>Discuss the important features of the following diseases with respect to epidemiology, risk factors, pathogenesis, diagnosis, prevention and control.</p> <p>Scrub typhus Japanese encephalitis</p>	Illustrate	Apply

SEMESTER - II					
Course Code	Course Name	L	T	P	Credits
EPH2023	Epidemiology of 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 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 NCDs of public health concern	Analyse
CO 4	Create a linkage of Non communicable diseases of infectious origin	Create
CO 5	Hands on experience on analyzing several health data, records on NCDs, maternal, child and geriatric health.	Skill

b. Syllabus

Units	Content	Hrs.
I	Non Communicable diseases at glance NCD typology, Risk factors for NCDs, Epidemiology of NCDs in India, Global Burden of disease survey related to NCDs, WHO STEPS, Health programme and policies in global level and Indian context w.r.t NCDs. Comparative health system associated with NCDs	12
II	Epidemiology of NCDs of Public health importance (CD) 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	12
III	Introduction to Genetic Diseases and in born errors Chromosomal aberrations, Haemoglobinopathies; Epigenetics and disease Blood grouping and Blood disorders Inborn errors of metabolism, Mutations and health, Methods of study (Epidemiological, Twin/ adoption and Family studies).	12
IV	Epidemiology of Mental health problems Mental retardation, Mental Health, Psychiatric health problems, addiction, depression, anxiety, Schizophrenia, Alzheimer's diseases, Parkinson's disease, Gaming disorder, etc	12
V	Epidemiology of Social health issues Domestic violence, Forced abortion, Early marriages and health problems including mental health, FGM, Substance abuse.	12
	Tasks and Assignments: Each student is required to submit the following:	

- ✓ Case study regarding the comparative epidemiological pattern of life style disorder in the developed, developing and underdeveloped countries
- ✓ Case study and submission of a report regarding epi methods used in NCDs in India, across the globe.

References:

1. Budreviciute A, Damiati S, Sabir DK, Onder K, Schuller-Goetzburg P, Plakys G, et al. Management and Prevention Strategies for Non-communicable Diseases (NCDs) and Their Risk Factors. *Frontiers in Public Health*. 2020;8. Available from: <https://www.frontiersin.org/articles/10.3389/fpubh.2020.574111>
2. WHO. Non communicable diseases. 2023. Available from: <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>
3. PAHO/WHO | Pan American Health Organization. Noncommunicable Diseases. 2023. Available from: <https://www.paho.org/en/topics/noncommunicable-diseases>
4. Noncommunicable Disease Surveillance, Monitoring and Reporting. <https://www.who.int/teams/noncommunicable-diseases/surveillance/systems-tools/steps> (accessed on July 2023)
5. Srinath Reddy K. Prevention and control of non-communicable diseases. In: Detels R, Gulliford M, Karim QA, Tan CC, editors. *Oxford Textbook of Global Public Health*. Oxford University Press; 2015. p. 0. Available from: <https://doi.org/10.1093/med/9780199661756.003.0237>
6. Singh MC. Public health approaches to non-communicable diseases. *Indian J Community Med*. 2016; 41(1):76.
7. 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
8. Hurster Madeline M (1997) *Communicable and Non-Communicable Disease Basics: A Primer* Bergin & Garvey. 1-168.
9. MoHFW. Program guidelines. Program Guidelines | Ministry of Health and Family Welfare | GOI (mohfw.gov.in)
10. MoHFW (2021). Health and Family Welfare Statistics In India 2019-20. [HealthandFamilyWelfarestatisticsinIndia201920.pdf](https://mohfw.gov.in/HealthandFamilyWelfarestatisticsinIndia201920.pdf) (mohfw.gov.in)
11. MoHFW (2022). Rural Health Statistics 2020-21. main.mohfw.gov.in/sites/default/files/rhs20-21_1.pdf
12. International Institute for Population Sciences. National Family Health Survey (NFHS-4) 2015-16 India. (2017). Available online at: <http://rchiips.org/NFHS/NFHS-4Reports/India.pdf> (accessed February 1, 2021).
13. International Institute for Population Sciences. National Family Health Survey (NFHS-5) 2019-21 India. (2022). Available online <https://dhsprogram.com/pubs/pdf/FR375/FR375.pdf>(Accessed on 15.06.23)

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 and 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

h. 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 an effect of COPD (chronic obstructive pulmonary disease)? (a) Destruction of alveoli (b) A decrease in the sensitivity of the body's cells to insulin (c) A reduction in the risk of lung cancer (d) A reduction in the risk of heart attack	Recognize	Remember
2	What are the features of the cirrhosis of the liver? (a) Impaired liver function (b) An increase in urea production (c) An increase in the efficiency of processing the products of digestion (d) Fatty liver	Recall	Remember
3	Which of the following is a major cause of type 2 diabetes? (a) Obesity (b) Too little sugar in the diet, lowering the blood sugar (c) Too vigorous exercise, causing a reduction in carbohydrate in the body (d) None of the above	Recognize	Remember
4	Raised cholesterol is highest in (a) Low-income countries (b) High-income countries (c) Poor countries	Recognize	Remember
5	Which of the following is not the modifiable risk factor? (a) Age (b) Alcohol use (c) Physical activity (d) Unhealthy diets	Recognize	Remember
6	What are the major drivers of non-communicable diseases? (a) Translational corporations (b) Viruses (c) Infections (d) Inflammations	Recognize	Remember

7	Which of the following is a modifiable risk factor? (a) Gender (b) Race (c) Genetics (d) Tobacco use	Recall	Remember
8	Which of the following diseases is not a non-communicable disease? (a) Cancer (b) Diabetes (c) Hypertension (d) AIDS/HIV	Recall	Remember
9	Most common form of substance used in India (a) Alcohol (b) Tobacco (c) cannabis (d) opioids	Identify	Remember
10	Which of the following best explains how cigarettes cause lung cancer? (a) Smoking cigarettes transfers viruses that cause cancer (b) Cigarette contains nicotine (c) Cigarette smoke contains chemical carcinogen (d) None of the above	Identify	Remember
PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50			
11.	What are non-communicable diseases? Explain the epidemiology any 3 non-communicable diseases in detail.	Explain	Understand
12.	Explain the different types of Cancers prevalent in India. Describe the significance of cancer diagnosis with respect to screening.	Differentiate Define	Understand
13.	Explain all the risk factors in depth which can directly or indirectly cause cardiovascular diseases.	Cite Examples	Understand
14.	What are non-modifiable risk factors? How do they influence the causation of non-communicable diseases?	Illustrate	Apply
15.	Explain the steps you would follow for the diagnosis of a non-communicable disease as a clinician. What would be your outmost advise to the subject to prevent non-communicable diseases like heart diseases and stroke?	Assess	Skill

SEMESTER - II					
Course Code	Course Name	L	T	P	Credits
EPH2025	Research Methodology	2	2		4

- **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

Unit I The research Process

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

Unit II. Ethics and different approvals required for research

thical guidelines in biomedical research: Declaration of Helsinki, Belmont report, CIOMS etc. Plagiarism; Types of research approval committees: Institutional Human Ethics Committee (IHEC), Institutional Biosafety Committee, Institutional Animal Ethics Committee; Procedures and process of getting research approvals.

Unit 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

Unit IV. Thesis writing

Components of a thesis: Abstract, Introduction, Materials and Methods, Results, Discussion and Future directions; How to write different 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.

Unit V

Fundamental characteristics of good research, Different types of plagiarism in thesis writing; How to avoid plagiarism in thesis; Review of literature assignments to educate on plagiarism; Plagiarism software, Computer assisted applications for qualitative analysis and Presenting, report writing and paper writing using qualitative data

Learning outcomes

Upon the completion of this course the student will be

1. Articulate about relevance of research in public health field

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

	<p>A) Improve data interpretation B) Confirm triangulation C) Introduce new variables D) Eliminate spurious relations</p>		
9	<p>Which one among the following is the most comprehensive source of population data? 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? A) Survey B) Historical C) Observation D) Philosophical</p>	Identify	Remember
	<p>PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50</p>		
11	Discuss the role of research methodology in palnning appropriate public health interventions	Explain	Understand
12	<p>a) Differentiate: interview method and observation as tools of data collection b) Define the following concepts- research ethics, sample, population</p>	Differentiate Define	Understand
13	<p>a) Give two examples wherein research ethics are in conflict with the organisational interests b) Give five shortcomings of poor research design</p>	Cite Examples	Understand
14	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
15	Using qualitative methods how do you propose to study the issues related to disability in Indian context.	Illustrate	Apply

EPH-S1-VAC1 Value added Course-Artificial Intelligence for Data Analysis

SEMESTER - II					
Course Code	Course Name	L	T	P	Credits
EPH202-VAC1	Artificial Intelligence for Data Analysis	1	1		2

Objectives:

To introduce and give an overview of Artificial Intelligence, data science and statistics to build systems that require management and analysis of large volumes of data.

To advance their technical skills to pursue research in the field of AI and Data Science and understand AI based model solutions to critical problem domains of EPH

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 Artificial Intelligence and data science	Understand
CO 2	Apply the data management techniques for healthcare data	Apply
CO 3	Examine the current public health problems and its solutions using AI based data prediction models	Analyse
CO 4	Link public health research problems like disease surveillance with big data prediction and AI based solutions	Create
CO 5	Develop health system research and technical skills to critically address public health problems using AI models and big data analytics	Skill

b. Syllabus

Units	Content	Hrs.
I	INTELLIGENT AGENTS Introduction to AI – Agents and Environments – concept of rationality – nature of environments – structure of agents. Problem solving agents – search algorithms – uninformed search strategies.	8
II	PROBLEM SOLVING Heuristic search strategies – heuristic functions. Local search and optimization problems – local search in continuous space – search with non-deterministic actions – search in partially observable environments – online search agents and unknown environments	8
III	LOGICAL REASONING Knowledge-based agents – propositional logic –knowledge representation and inferences in first-order logic – forward chaining – backward chaining – resolution.	8
IV	PROBABILISTIC REASONING Acting under uncertainty – Probabilistic reasoning –causal networks	8
V	AI models and big data in Public health	8

	Introduction to AI models used in public health, big data analytics in public health and disease prediction using AI. Discussion of case studies- Predicting Mortality for cardiology Practice –Smart Ambulance System using IOT –Hospital Acquired Conditions (HAC) program- Healthcare and Emerging Technologies – ECG Data Analysis.	
	Tasks and Assignments: Each student is required to submit the following: Record books weekly once Seminar presentation	
	<p>References</p> <ol style="list-style-type: none"> 1. Dan W. Patterson, “Introduction to AI and ES”, Pearson Education, 2007 2. Kevin Night, Elaine Rich, and Nair B., “Artificial Intelligence”, McGraw Hill, 2008 3. Patrick H. Winston, "Artificial Intelligence", Third Edition, Pearson Education, 2006 4. Deepak Khemani, “Artificial Intelligence”, Tata McGraw Hill Education, 2013 5. Stuart Russell and Peter Norvig, “Artificial Intelligence – A Modern Approach”, Fourth Edition, Pearson Education, 2021 6. Chandan K.Reddy, Charu C. Aggarwal, “Health Care data Analysis”, First edition, CRC, 2015. 7. Vikas Kumar, “Health Care Analysis Made Simple”, Packt Publishing, 2018. 8. Nilanjan Dey, Amira Ashour , Simon James Fong, Chintan Bhatl, “Health Care Data Analysis and Management, First Edition, Academic Press, 2018. 9. Hui Jang, Eva K.Lee, “HealthCare Analysis : From Data to Knowledge to Health care Improvement”, First Edition, Wiley, 2016. 10. Kulkarni , Siarry, Singh ,Abraham, Zhang, Zomaya , Baki, “Big Data Analytics in HealthCare”, Springer, 2020 11. Timothy L. Wiemken and Robert R. Kelley. Machine Learning in Epidemiology and Health Outcomes Research. Annual Review of Public Health 2020 41:1, 21-36 12. Baclic O, Tunis M, Young K, Doan C, Swerdfeger H, Schonfeld J. Challenges and opportunities for public health made possible by advances in natural language processing. Can Commun Dis Rep. 2020 Jun 4;46(6):161-168. doi: 10.14745/ccdr.v46i06a02. PMID: 32673380; PMCID: PMC7343054. 	

Learning outcomes:

The students are expected to learn about the significance and need of big data analysis in health using AI models and develop technical skills to critically address public health problems using AI models and big data analytics

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 = 500 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 and 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
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Sl. No.	Model Questions	Specification	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	What is Artificial Intelligence? a) Artificial Intelligence is a field that aims to make humans more intelligent b) Artificial Intelligence is a field that aims to improve the security c) Artificial Intelligence is a field that aims to develop intelligent machines d) Artificial Intelligence is a field that aims to mine the data	Recognize	Remember
2	Who is the inventor of Artificial Intelligence? a) Geoffrey Hinton b) Andrew Ng c) John McCarthy d) Jürgen Schmidhuber	Recall	Remember
3	Which of the following is the branch of Artificial Intelligence? a) Machine Learning b) Cyber forensics c) Full-Stack Developer d) Network Design	Recognize	Remember
4	What is the goal of Artificial Intelligence? a) To solve artificial problems b) To extract scientific causes c) To explain various sorts of intelligence d) To solve real-world problems	Recognize	Remember
5	What is the name of the Artificial Intelligence system developed by Daniel Bobrow? a) program known as BACON b) system known as STUDENT c) program known as SHRDLU d) system known as SIMD	Recognize	Remember
6	What is the function of the system Student? a) program that can read algebra word problems only b) system which can solve algebra word problems but not read c) system which can read and solve algebra word problems d) None of the mentioned	Recognize	Remember
7	Which of the following machine requires input from the humans but can interpret the outputs themselves?	Recall	Remember

	<ul style="list-style-type: none"> a) Actuators b) Sensor c) Agents d) AI system 		
8	<p>_____ number of informed search method are there in Artificial Intelligence.</p> <ul style="list-style-type: none"> a) 4 b) 3 c) 2 d) 1 	Recall	Remember
9	<p>On which of the following approach A basic line following robot is based?</p> <ul style="list-style-type: none"> a) Applied approach b) Weak approach c) Strong approach d) Cognitive approach 	Identify	Remember
10	<p>What is the name of Artificial Intelligence which allows machines to handle vague information with a deftness that mimics human intuition?</p> <ul style="list-style-type: none"> a) Human intelligence b) Boolean logic c) Functional logic d) Fuzzy logic 	Identify	Remember
	<p>PART – B Long Answer</p> <p>The answer should not exceed 1500 words 10x 5 = 50</p>		
11	What is big data? What are the different types?	Differentiate Define	Understand
12	How can big data analytics be used in public health, especially in epidemiological surveillance?	Explain	Understand
13	Explain some of the challenges that come with a big data project?.	Explain	Understand
14	What are the five Vs of big data?	Illustrate	Apply
15	What are the different domains/Subsets of AI?	Explain	Understand
16	Write an essay on machine learning and algorithmic fairness in public and population health with case study examples.	Assess	Apply Skill

Semester III

SEMESTER - III					
Course Code	Course Name	L	T	P	Credits
EPH2031	Methods in field epidemiology	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 importance of field epidemiology for healthy life	Understand
CO 2	Identify application of different tools and methods field epidemiology for several diseases and or conditions of public health importance	Apply
CO 3	Critically analyze the application of different techniques in defining determinants of disease	Analyze
CO 4	Devising prevention and control strategy for disease based on the outcome of field epidemiology	Create
CO 5	Hands on experience on field epi methods	Skill

b. Syllabus

Units	Content	Hrs.
I	Investigation of the diseases at healthcare settings or facility based study Good manufacturing practices, Good clinical practices, Good lab practices, Aim, scope and application of facility based disease surveillance, PICO strategy to be followed, analysis of socio economic and demographic factors, identifying and establishing causation, basis of transmission dynamics, optimizing and convergence of questionnaire based survey techniques with lab techniques for analysis and interpretation of diseases outbreak, case study involving facility based surveillance. Case study on hospital outbreak of MRSA	12
II	Investigation of food borne diseases outbreak Concept of ISI, BSI, ICMSF, HACCP FSSAI , 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, Detection and quantitation of food-borne pathogens, toxins, antibiotics, pesticides and additives in foods Steps in food borne diseases outbreak investigation, PICO strategy to be followed, analysis of socio economic and demographic factors, identifying and establishing causation, basis of transmission dynamics, optimizing and convergence of questionnaire based survey techniques with lab techniques for analysis and interpretation of food borne diseases outbreak, case study involving food borne diseases outbreak.	12

III	<p>Investigation of infectious diseases of public health concern Steps in outbreak investigation during epidemic, pandemic, sporadic diseases with case studies, PICO, Examples of bacterial, viral, parasitic, fungal vector borne diseases outbreak investigations, emerging diseases outbreak investigation, preparedness, health communication during pandemics, convergence of population based survey with lab finding for evidence synthesis, Reproduction number (R0); Infectious dose, Surveillance for AMR , Case studies</p>	12
IV	<p>Case study on public health nutrition Investigations of Nutritional anomalies (stunting, wasting, anemia) in population, (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. Case studies, Study designs and evaluation of Under-five child nutritional status, adolescence nutritional status, maternal nutrition status, geriatric nutritional status, case studies and critical analysis of methodologies E.G. RCTs regarding supplementation of vitamin, mineral and protein fortified community ration, Fe- folic acid supplementation to adolescence girls, pregnant mothers</p>	12
V	<p>Investigations of NCDs of Public health concern Population based investigation of diabetes, obesity, hypertension, stroke, CVDs, Cancers. Identification of risk factors associated with all the diseases concern, identifications of biomarkers, screening and diagnosis, Case control, Cross sectional, Longitudinal study designs and analysis there of regarding NCDs, RCTs on therapy and diagnosis and risk factors modifications. Population based survey of mental health issues and disorders</p>	12
	<p>Tasks and Assignments: Each student is required to submit the following:</p> <ul style="list-style-type: none"> ✓ Critically Analyze and Submit Report of Case Studies on Field Epidemiology ✓ References: <ol style="list-style-type: none"> 1. Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET). https://www.cdc.gov/globalhealth/healthprotection/fetp/additionalresources.htm(Accessed on July 23) 2. André AM, Lopez A, Perkins S, Lambert L, Chace L, Noudeke N, et al. Frontline Field Epidemiology Training Programs as a strategy to improve disease surveillance and response. Emerg Infect Dis. 2017 Dec [date cited]. https://doi.org/10.3201/eid2313.170803 3. Jones DS, Dicker RC, Fontaine RE, Boore AL, Omolo JO, Ashgar RJ. et al. Building global epidemiology and response capacity with Field Epidemiology Training Programs. Emerg Infect Dis. 2017; 23:158–65. 10.3201/eid2313.170509 4. Michael Gregg . Field Epidemiology, Oxford University Press, 2008 5. Sonja A. Rasmussen and Richard A. Goodman. The CDC Field Epidemiology Manual, Oxford University Press, 2018 	

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

h. Model Questions

Part – A: Objective Type Multiple choice 10 x 1 = 10			
1	“Triangle of Epidemiology” includes all except, A. Host B. Environment C. Time D. Source	Recognize	Remember
2	Which of the following disease can be monitored in a community using Sentinel surveillance? A. HIV-AIDS B. Typhoid C. KFD D. Scrub typhus	Recall	Remember
3	. If out of 100 people, 40 people get the disease from the primary case, then secondary attack rate would be: A. 4% B. 40% C. .4% D. .04%	Recognize	Remember
4	Food poisoning is a type of: A. Continuous epidemic B. Point source epidemic C. Long term epidemic D. Periodic epidemic	Recognize	Remember
5	James Lind’s performed human experiments to study the diet of soldiers who were suffering from: A. Pellagra B. Scurvy C. Rickets D. Beri Beri	Recognize	Remember
6	A disease that is always present in high incidence and affects all age groups equally is called as: A. Mesoendemic B. Holoendemic C. Hyperendemic D. Sporadic	Recognize	Remember
7	5-10% bleaching solution is: A. Bactericidal B. Virucidal C. Fungicidal D. All of the above	Recall	Remember
8	An effective way to control Typhoid is: A. Mass chemoprophylaxis B. Control of Sanitation C. Immunisation D. Both (B) and (C)	Recall	Remember

9	Following are the adverse effects of maternal malnutrition except? (a) Maternal depletion (b) Low birth weight (c) Toxemias of pregnancy	Identify	Remember
10	Single exposure, point-source epidemic is a feature of all except (a) <i>Salmonella</i> poisoning (b) <i>E. coli</i> poisoning (c) Pneumonia (d) <i>Campylobacter</i>	Identify	Remember
	PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50		
1	What is Antimicrobial Resistance? Explain the hazards of Antimicrobial Resistance in the context of “one health”.	Explain	Understand
2	Explain in detail all the different types of techniques (both laboratory and field based) that can help in the detection of foodborne outbreak in a community setting.		Understand
3	What is PICO framework? What relevance does it hold in field-based epidemiology? Explain in detail.	Define	Understand
4	Outline the steps of outbreak investigation for the following (one) disease briefly using a simple example: (a) Stunting OR wasting (b) MRSA OR Salmonella outbreak (c) Malaria OR Dengue outbreak	Illustrate	Understand
5	What is Reproduction Number (R0) in field-based epidemiology? How does it impact our understanding of outbreak investigations in the context of Communicable diseases?	Explain	Skill

SEMESTER – III					
Course Code	Course Name	L	T	P	Credits
EPH2032	Health Policies, Programs, Acts and Evaluation	2	2	0	4

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

	Course Outcome	Level
CO 1	To learn the role of various stakeholders in policy development to improve health status of population	Understand
CO 2	To check relevance of strategies/ interventions of national health programmes to improve health status in the country	Apply
CO 3	Examine the relevance of public health acts in public health promotion and discuss important public health laws	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

Unit-I. Health Policy, Planning & Evaluation

Health and Development, Role of policy programs 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.

Unit-II. National Health Programmes in India

Background objectives, action plan, targets, operations, achievements and constraints of important National Health Programmes in India. National Population policy, Family planning programs in India, Census, other data sources & its impact on health planning in India.

Unit- III. Public Health Acts-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.

Unit-IV. Public Health Acts-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, regulations regarding health care institutions (Structure and functioning), Article 377 and Bio-medical waste rules, the transplantation of human organs Act., Epidemic Diseases Act, Disaster Management Act, the Essential Services Maintenance Act

Unit V- Public Health Acts- III

Gender-based violence (including medical violence, eg forced sterilizations, forced abortions, harmful treatments of fertility, FGM), Laws regarding HIV disclosure, Surrogacy Regulation Act 2021, Right of persons with disabilities Act 2016, Sexual Harassment of Women at Work Place (Prevention, Prohibition and redressal) Act 2013.

Learning outcomes

Upon the completion of the course the student should be

1. Discuss need, potential and limitations of national health programs (NHP)
2. Be aware of a perspective to examine national health programs and critique NHP for quality, equity, inclusion, private sector participation and ethical and rights aspects
3. Identify and discuss provisions of various legal Acts that are relevant for public health

Suggested readings

1. Kishore, J (2016) National Health Programmes of India National Policies and Legislations Related to Health, Century Publications, New Delhi, 12 th Edition.
2. Park and Park (2023). Text book preventive and social medicine. 27th Edition, Jabalpur, India: Banarsidas Bhanot
3. Gupta, R.P. (2016). Health Care Reforms in India: Making Up for the Lost Decades. Elsevier India.
4. Collins, C., Green, A. (2014). Valuing Health Systems: A Framework for Low and Middle Income Countries. SAGE Publications.
5. Gilson, L., Alliance for Health Policy and Systems Research, World Health Organization, (2012). Health policy and systems research: a methodology reader.
6. 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.
7. Cleason, Mariam and Alexander Ashok (2008) Tackling HIV in India: Evidence-Based Priority Setting and Programming. Health Affairs 27(4):1091-1102. doi:10.1377/hlthaff.27.4.1091
8. Kishore, J (2002): National Health Programmes of India, National policies and Legislations Related to Health, 4 th ed., New Delhi: Century Publications.
9. Starfield, B., & Shi, L. (2002). Policy relevant determinants of health: an international perspective. Health Policy, 60(3), 201-218.
10. Reich, M. R. (1995). The politics of health sector reform in developing countries: three cases of pharmaceutical policy. Health Policy, 32(1), 47-77.
11. Universal health care in India <https://nhsrcindia.org/sites/default/files/2021-04/Universal%20Health%20Care%20in%20India%20A%20Sengupata%20May-2013.pdf> (ACCESSED on 16.08.23)

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 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 and 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

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 (A) 2017 (B) 2003 (C) 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 (A) 2.8 (B) 2.7 (C) 1.8 (D) 2.1	Recognize	Remember
4	Medical termination of Pregnancy Act aims to (A) Provide safe abortion facilities to all women (B) Provide safe abortion facilities only to married women (C) Neither A Nor B (D) Legalise sex-selective abortion	Recognize	Remember

5	ESI Act was passed in (A) 1948 (B) 1958 (C) 1968 (D) 1978	Recognize	Remember
6	Health Policy is A) Absolute and Binding on the Government B) It gives direction to the government about broader goals C) Ensures mandatory budget availability D) Ensures adequate manpower	Recognize	Remember
7	WHO was established in A) 1954 A) B)1964 B) C) 1948 C) D)1964	Recall	Remember
8	The Surrogacy Regulation Act was passed in A) 2022 B) 2017 C) 2018 D) D)2019	Recall	Remember
9represents and protects the health of workers in the workplace. A) ESI Act 1948 B) Factories Act 1848 C) Neither A nor B (A) D) Both A and B	Identify	Remember
10	Prevention of adulteration Act mandates (A) The appointment of food inspectors (B) The appointment of public analysts (C) Establishing laboratories in different parts of the country (D) All the Above	Identify	Remember
PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50			
11	Discuss the role of public health policy in shaping health goals in a country	Explain	Understand
12	a) Differentiate: health programme and health Acts (or) b) Define the following concepts- Surrogacy, Census and Biomedical waste	Differentiate Define	Understand
13	a) Give two examples wherein PCPNDT Act failed to meet its objectives b) Give two shortcomings of National health Policy 2017	Cite Examples	Understand
14	Illustrate the role of MTP Act in ensuring reproductive rights of women in the country	Illustrate	Apply
15	a) Assess the relevance of Factory Act and ESI Act in ensuring workers health, welfare and well-being	Assess	Skill
16	Assess the relevance of Sexual harassment of Women at workplace (Prevention and Redressal) Act. Highlight the limitations of this Act from a gender point of view.	Assess	Skill

SEMESTER - III					
Course Code	Course Name	L	T	P	Credits
EPH2033	Health Economics and Health Financing	2	2		4

- **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), Health Technology Assessment.	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, Health Budgeting and Healthcare negotiations Healthcare markets, Conditions under which normal markets and insurance markets work, market failure in health care, Healthcare negotiations, Health budgeting- principles and types	12
v	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	12
	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 References: 1. Guinness, L. and Wiseman, V. (2011) Introduction to Health Economics (second edition) Open University Press.	

2. Gottret, P. E., & Schieber, G. (2006). *Health financing revisited: a practitioner's guide*. World Bank Publications.
3. Morris S, Devlin N and Parkin D. (2007) *Economic Analysis in Health Care*, Chichester, Wiley
4. 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>
5. Olsen J. (2009) *Principles in Health Economics and Policy*, Oxford, Oxford University Press.
6. McPake B, Normand C and Smith S. (2013) *Health economics – an international perspective*, (3rd Ed) Routledge, London.
7. Folland S, Goodman AC and Stano M. (2013) *The economics of health and health care*, (7th Ed) Prentice Hall, Upper Saddle River, New Jersey.
8. Palmer G and Ho M. (2008). *Health Economics: a critical and global analysis*. Palgrave MacMillan, New York.
9. Grossman, M. (2000). The human capital model. In *Handbook of health economics* (Vol. 1, pp. 347-408). Elsevier.
10. Santerre, R. E., & Neun, S. P. (2012). *Health economics: Theory, insights, and industry studies*. Cengage Learning.
11. Cuyler, A., & Newhouse, J. 2000. *Handbook of health economics*
12. Brennan, A.; Chick, S.E.; Davies, R. A taxonomy of model structures for economic evaluation of health technologies. *Health Econ.* 2006, 15, 1295–1310.
13. Prinja S, Rajsekhar K, Gauba VK. Health technology assessment in India: Reflection & future roadmap. *Indian J Med Res.* 2020 Nov;152(5):444-447.
14. World Health Organization. Health technology assessment. Available from: https://www.who.int/medical_devices/assessment/en/
15. Department of Health Research. Health Technology Assessment in India - HTAIn.. Available from: <https://dhr.gov.in/sites/default/files/eNewsletter/img/HTAIn/HTAIn10-01-2017.pdf> .

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 and 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 b. Waiting periods c. Capitation payment d. Gate-keeping	Recall	Remember
3	Which statement/statements is/are correct about income elasticity of demand a. When $EI > 0$, i.e.the good is a “normal” good. b. When $EI > 1$, the good is a “luxury” good c. When $EI < 0$, i.e. the good is an “inferior” good. d. All of the above	Recognize	Remember
4	Drug provided by third party manufacturers despite the drug are still patented is called..... a. Counterfeit drug	Recognize	Remember

	<ul style="list-style-type: none"> b. Copy drug c. Generic drug d. Brand-name drug 		
5	<p>Mark the correct statement</p> <ul style="list-style-type: none"> a) Allocative Efficiency is meeting a given objective at least cost b) Technical Efficiency is producing the pattern of supply that matches the pattern of consumer demand c) Efficiency is maximizing benefit for resources used d) Economic efficiency is smallest input to get a stated output 	Recognize	Remember
6	<p>Horizontal equity is</p> <ul style="list-style-type: none"> a) Unequal resources for unequal need b) The state of being the same c) Equal resources for equal need d) Differences in health status between individuals 	Recognize	Remember
7	<p>When income elasticity of demand is greater than 1, it is</p> <p>a.....good</p> <ul style="list-style-type: none"> a) Normal b) Inferior c) Luxury d) None of the above 	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> <ul style="list-style-type: none"> a) price inelastic b) price elastic c) price flexible d) price efficient 	Recall	Remember
9	<p>Fall in price of substitute will</p> <ul style="list-style-type: none"> a) Shift demand curve outward b) Shift supply curve outward c) Shift demand curve inward d) Both A and B 	Identify	Remember
10	<p>Demand for health insurance is a result of.....</p> <ul style="list-style-type: none"> a) Uncertainty b) Illness c) Healthcare Professional d) Cost 	Identify	Remember
<p>PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50</p>			
11	<p>What is strategic purchasing? Name the common approaches to purchasing primary health care services around the world.</p>	Explain	Understand
12	<p>Define demand? Explain demand curve (with graph), movement along demand curve and shifting of demand curve</p>	Define Explain	Understand
13	<p>What is adverse selection and list out the possible solutions for minimizing adverse selection?</p>	Cite Examples	Understand
14	<p>What is Universal health coverage? Explain using UHC cube.</p>	Illustrate	Apply
15	<p>Assess the existing health insurance schemes in India using WHO health financing matrix.</p>	Assess	Skill

SEMESTER - II					
Course Code	Course Name	L	T	P	Credits
EPH203P-3	Advanced laboratory techniques in 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 advanced laboratory techniques	Understand
CO 2	To apply understanding of lab techniques for delineating disease causing pathogen	Apply
CO 3	Examine the role of several molecular biomarkers in health and disease	Analyse
CO 4	Preparation of disease specific model for delineating the role of pathogens , attributes of the human genetics	Create
CO 5	Hand on experience on basic bacteriology, virology, molecular biology techniques	Skill

b. Syllabus

Units	Content	Hrs.
I	Laboratory. Good laboratory practice (GLP). Good clinical practice (GCP). Collection, processing, and storage of biological specimens for Epidemiological Studies. Bioinformatics (for sequence retrieval and analysis) and primer design. Multiple sequence alignment and phylogenetic analysis. Molecular markers of infectious agents (or candidate genes for the detection and enumeration of infectious agents). Molecular differentiation of bacterial strains and viruses.	12
II	Laboratory. DNA isolation, Isolation of RNA. Measurement of quality and quantity of DNA and RNA. PCR. RFLP of the PCR products (for genotyping or the identification of SNPs). Real-time PCR (for determining the load of viruses).	
III	Cell culture methods for virus isolation and identification	
IV	Basic serological techniques (Principles of ELISA, agglutination test, precipitation test)	
V	Morphology, anatomy and method of collection, maintenance of vectors with special reference to mosquitoes Rearing, and maintenance of mosquito culture, Methods of mosquito collection from field, Blood meal Identification, Identification of	12

	<p>mosquitoes, Dissection of midgut and salivary gland of mosquitoes, ITS-2 based classification of mosquitoes</p> <p>Insecticidal assay protocols</p> <p>Bioassay with insecticides and calculation of LC50 and LC90, Larvicidal test, Adulticidal test, Cone test</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 molecular epidemiological study on One Health perspective ✓ Case study regarding AMR and determinants of AMR ✓ Case study regarding the available mosquito species in and around Thiruvarur ✓ Case study regarding documenting the availability of locally available biological and ecofriendly substances for mosquito control. 	

	<ol style="list-style-type: none"> 1. Imms, A. D. A general text book of Entomology. ELBS, London 2. Marquardt, W.C. Biology of disease vectors (2nd Edition). Doody Enterprises, Inc.USA 3. Service, M. W. Mosquito Ecology, Field sampling methods. Applied Science Publishing Ltd., London. 4. 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. 5. Principles of Gene Manipulation and Genomics. S.B. Primrose and R.M. Twyman. 7th edition (2014) 6. 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 7. Karp G (2010) Cell and Molecular Biology: Concepts and Experiments, 6th edition, John Wiley & Sons. Inc. 8. Sambrook J and Russell DW. (2001). Molecular Cloning: A Laboratory Manual. 4th Edition, Cold Spring Harbour Laboratory press. 9. Loop Mediated Isothermal Amplification of DNA. Nucleic Acid Research. 2000 Jun 15; 28(12): e63 	
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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 (Experiments with Question answers)	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 with questions 10x 5 = 50			
1	Diagnosis of bacterial diseases associated with food born outbreak	Identify	Recognize
2	Isolation and estimation of DNA and quantitate the load of virus in dengue affected individuals	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					
Course Code	Course Name	L	T	P	Credits
EPH203P-4	Data Analytics in Health Sciences using R software			2	2

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 using R	Understand
CO 2	To apply the knowledge of hypothesis testing using R	Apply
CO 3	Analyse data sets using R	Analyse
CO 4	Data manipulation using R	Create
CO 5	Data handling and analysis using R	Skill

b. Syllabus

Units	Content	Hrs.
I	Introduction to R and Introduction to R-software and getting data into R Studio: Installing R and R Studio, R console and Introduction to Packages in R	8
II	Data Analysis using R Univariate analysis: calculation of summary measures- mean, median, mode, IQR, and SD, checking normality and outliers checking through graphs. Bivariate analysis and multivariate analysis using R	8
III	Descriptive statistics & Data visualization : calculation of summary measures- mean, median, mode, IQR, and SD, checking normality and outliers checking through graphs, Table generation, histogram, box plot, bar diagram, scatter plot, pie chart.	8
IV	Types of statistical tests- Parametric tests: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.	8

	<p>Tasks and Assignments:</p> <p>Each student is required to submit the following:</p> <ul style="list-style-type: none"> ✓ Record books weekly once ✓ Data analysis report using R with univariate, bivariate and multivariate analysis <p>References:</p> <ol style="list-style-type: none"> 1. Aragon T J. Applied Epidemiology using R. University of California, Berkeley School of Public Health, and the San Francisco Department of Public Health; 2013. 2. Kamath A, Meleth A, Sathiakumar N. R Manual for Health Science Researchers. Manipal University Press; 2012. 3. Stanton. J (2012). Introduction to Data Science. Syracuse University. 4. Das, S, R., & Das, S. (2016). Data science: theories, models, algorithms, and analytics. Learning, 143, 145 5. Joseph Rickert, An R community blog edited by RStudio. An R View into Epidemiology · R Views (rstudio.com) 6. RStudio. FAQ: Tips for writing r-related questions. Published online September 2021. 7. Wickham H (2019). Style guide. In: Advanced R. 8. R Development Core Team (2020). An Introduction to R. 9. Carstensen, Bendix, Epidemiology with R (Oxford, 2020; online edn, Oxford Academic, 21 Jan. 2021), https://doi.org/10.1093/oso/9780198841326.001.0001, accessed 19 July 2023. 	
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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	8	8	8	8	8	40
Total	20	20	20	20	20	100

e. Mapping Course Outcome with Internal Assessment (60 Marks)

	CO1	CO2	CO3	CO4	CO5
Assignments	6	6	6	5	5
Practical test	6	6	6	6	6
Total	12	12	12	12	12

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 tests 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

h. Model Question Paper

Sl. No.	Model Questions	Specification	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	R functionality is divided into a number of _____. a) packages b) functions c) domains d) classes	Recognize	Remember
2	The _____ R system contains, among other things, the base package which is required to run R and contains the most fundamental functions. a) root b) child c) base d) dplyr	Recall	Remember
3	Which of the following is a base package for the R language? a) utils b) lang	Recognize	Remember

	<p>c) tools d) Both a and c</p>		
4	<p>Which of the following is a recommended package in R? a) util b) lang c) stats d) spatial</p>	Recognize	Remember
5	<p>Which of the following codes skips the first 20 iterations? a) <code>for(i in 1:100){ if(i <=20){ next } print(i) }</code> b) <code>for(i in 1:100){ if(i <=19){ next } print(i) }</code> c) <code>for(i in 1:100){ if(i <=21){ next } print(i) }</code> d) <code>for(i in 1:100){ if(i <21){ next } print(i) }</code></p>	Analyse	Apply
6	<p>Which of the following true about loops in R? a) The only way to exit a repeat loop is to call break. b) Infinite loops should be avoided. c) Neither a nor b is correct. d) Both a and b are correct.</p>	Analyse	Apply
7	<p>_____ initiates an infinite loop right from the start. a) never b) repeat c) break d) set</p>	Recall	Remember
8	<p>Which of the following code snippets stops a loop after 20 iterations? a) <code>for(i in 1:100){ if(i >20){ break } print(i) }</code> b) <code>for(i in 1:100){ if(i >19){ break } print(i) }</code> c) <code>for(i in 1:100){ if(i <20){ break } print(i) }</code> d) <code>for(i in 1:100){ if(i <19){ break } print(i) }</code></p>	Recall	Remember
9	<p>The syntax of the repeat loop is _____. a) rep statement b) repeat statement c) repeat else d) rep else</p>	Identify	Remember
10	<p>What will be the output of the following code? <code>x <- 3 switch(x, 2+2, mean(1:10), rnorm(5))</code> 1. Random Value 2. 5.5 3. NULL 4. Both b and c</p>	Analyze	Apply
<p>PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50</p>			
11	<p>a) What are the different types of data? Give examples. b) List and explain at least FIVE types of data presentation.</p>	Explain, differentiate	Understand
12	<p>a) Define “population” and “sample”. Why do we need sampling and what are the different types of sampling techniques used in epidemiological studies?</p>	Differentiate Define	Understand
13	<p>What are the steps involved in deciding appropriate statistical method for research? List the statistical assumptions for parametric tests.</p>	Illustrate	Understand

14	<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
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SEMESTER - III					
Course Code	Course Name	L	T	P	Credits
EPH202DSE2	Gender and Population health	2	2		4

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	Develop skills to critically evaluate health interventions and healthcare programs using gender lens	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	Gender -Social position and health inequities: Gender differences in mortality, morbidity, health care access and health seeking behavior among men, women and third gender.	12
III	Fertility, Mortality and Migration Definition, Need for Fertility, Fecundity, Data sources of Fertility, Peculiarities of Birth data, Factors affecting Fertility, Brief historical background, Definition, Source of data, Limitation of Mortality data, Analysis of Mortality statistics, Migration in India, Urbanization	12
IV	Gender Indices Gender Development Index, Gender Empowerment Index, Gender Inequality Index	12
V	Gender analysis framework and tools: Gender Responsiveness Assessment Scale, WHO Gender Analysis Matrix (GAM), World Health Organization's gender analysis checklist for policies and programmes	12
	Tasks and Assignments:	

Each student is required to submit the following:

- ✓ 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

References:

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 Population Problems. Tata Mc Graw Hill, New Delhi.
9. Donald, J. B., 1984, Demography: A Recent Trend. Oxford Publication.
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.
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)
19. J.S. Weiner and J.A. Lourie, 1969, Human Biology: A Guide to Field Methods. IBP Hand Book No. 9., Oxford : Blackwell Scientific Publication.
20. WHO (2015). Monitoring Health Inequality: An essential step for achieving health equity; 2015.
21. WHO (2015). Health Equity Monitor Compendium of Indicator Definitions. Indicator Code Book. Health Equity Monitor; 2015.

<p>Measuring Health Inequalities: Gini Coefficient and Concentration Index. http://www1.paho.org/English/SHA/be_v22n1-Gini.htm</p> <p>22. WHO (2013). Handbook on health inequality monitoring: with a special focus on low- and middle-income countries. World Health Organization; 2013. ISBN 978 92 4 154863 2</p> <p>23. Human Development Reports http://hdr.undp.org</p> <p>24. WHO (2002). Gender Analysis in Health: a review of selected tools. Department of Women and Gender Health.</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	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 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, but not developed and supported with evidence facts mostly	Ideas are presented but not particularly developed and 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

Sl. No.	Model Questions	Specification	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	As the son, so the father – this statement favours for A. Nature B. Nurture C. Father D. Son	Recognize	Remember
2	Producing innovative ideas is A. Self Concept B. Creativity C. Intelligence D. Personality	Recall	Remember
3	Animism develops in which stage of Piaget A. I B. II C. III D. IV	Recognize	Remember
4	Universal Principle arises in A. Pre Conventional B. Conventional C. Post Conventional D. Modern Conventional	Recognize	Remember
5	A child has an inferiority complex if it is/in A. Rich B. Matured Environment C. Motivated D. Jail	Recognize	Remember
6	Unable to choose between playing cricket or tennis is A. Delusion B. Illusion C. Conflict D. Confusion	Recognize	Remember
7	A crime committed by a child is known as A. Childish B. Illusion C. Distortion D. Juvenile Delinquency	Recall	Remember
8	The word, “Adolescence” means A. Senescence B. Growing C. Problematic D. Imaging	Recall	Remember
9	Bhatia’s Battery is used to measure A. Self Concept B. Creativity C. Intelligence D. Personality	Identify	Remember
10	The word, “Personality” means A. Mask B. Creative C. Actor D. Celebrity	Identify	Remember
	PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50		
21	Discuss the role of nurture in human development (or) Discuss the role of nature in human development	Explain	Understand
22	a) Differentiate: Growth, Maturity and Development (or) b) Define the following concepts; Creativity and Personality	Differentiate Define	Understand
23	a) Give two real-life examples for Pre Conventional Morality (or)	Cite Examples	Understand

	b) Give two real-life examples for Post Conventional Morality		
24	b) Illustrate Piaget's Concrete Operational Stage (or) c) Illustrate Piaget's Formal Operational Stage	Illustrate	Apply
27	a) Assess personality using Eysenck questionnaire (or) b) Assess Self Concept by administering the tool	Assess	Skill

a. Course Outcome (CO)

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

	Course Outcome	Level
CO 1	To understand reproductive and sexual health in epidemiological context	Understand
CO 2	To learn biological, psychological and social aspects of sexual health, reproductive health issues and, foundations of sexuality	Apply
CO 3	Examine the relevance of various laws and rights related to reproductive health	Analyse
CO 4	Link public health practice and approaches to develop effective interventions related to reproductive and sexual health	Create
CO 5	Develop skills and gain competencies to solve issues related to reproductive and sexual health	Skill

Unit-I: Introduction to reproductive and sexual health

Reproductive and sexual health- public health perspective, Sexual health, human rights and law, Convention on the Elimination of All Forms of Discrimination Against Women and UN guidelines on reproductive health

Unit-II: Sexuality and Sexual health and rights

Foundations in sexuality and sexual health, Construction of sexuality, Control of Sexually Transmitted Infections, HIV/AIDS and Current sexual health (e.g. STIs) and reproductive health issues (infertility, abortions, maternal mortality)

Unit-III: Reproductive health and rights

Reproductive health rights -concepts and components, Family planning programmes in India, National population policy and Evidence based approaches to research of reproductive, sexual health issues, Role of bilateral and multilateral organisations in protecting the rights, Gender-based violence (including medical violence, eg forced sterilisations, forced abortions, harmful treatments of fertility) and Accountability for sexual health and human rights.

Unit-IV: Surrogacy and public health significance

Surrogacy and women’s rights to health, Current Issues in Safe Motherhood & Perinatal Health, Surrogacy ethical and legal issues and Surrogacy- issues and perspectives.

Unit V:

Public health aspect of obstetrics, paediatrics

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, premature birth, Low birth weight babies, Perinatal rate in India, Perinatal mortality, Neonatal mortality rate, Post-neonatal mortality rate, Causes of infant mortality, IMNCI

References:

Essential Readings:

1. Paul Van Look Kristian Heggenhougen Stella R. Quah. (2011). Sexual and Reproductive Health A Public Health Perspective Academic Press 348. eBook ISBN: 9780123850102

4 Glasier, A., Gülmezoglu, A. M., Schmid, G. P., Moreno, C. G., & Van Look, P. F. (2006). Sexual and reproductive health: a matter of life and death. The Lancet, 368(9547), 1595-1607.

5. Bearinger, L. H., Sieving, R. E., Ferguson, J., & Sharma, V. (2007). Global perspectives on the sexual and reproductive health of adolescents: patterns, prevention, and potential. *The Lancet*, 369(9568), 1220-1231. 10
6. Edwards, W. M., & Coleman, E. (2004). Defining sexual health: a descriptive overview. *Archives of sexual Behavior*, 33(3), 189-195.
7. Parker, R. G. (2007). Sexuality, health, and human rights. *American Journal of Public Health*, 97(6), 972.
8. Cook, R. J., Dickens, B. M., & Fathalla, M. F. (2003). *Reproductive health and human rights: integrating medicine, ethics, and law*. Clarendon Press.
9. Wilcox AJ. *Fertility and pregnancy an epidemiologic perspective*. New York: Oxford University Press; 2010.
10. Louis GB, Platt R. *Reproductive and perinatal epidemiology*. Oxford ;: Oxford University Press; 2011.

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 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 facts mostly specific.	Ideas are presented but not particularly developed supported.	Content is not sound	Not attended	CO1, CO2, CO5

2	Organiza- -tion 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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Sl. No.	Model Questions	Specifica- tion	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	All of the following are assisted reproductive techniques (ART) except: Embryo Transfer Amniocenteses Intra cytoplasmic sperm injection Intra uterine transfer		
2	Reproductive health includes the aspects of: Psychological Behavioral Social All of the above		
3	MTP act, which was passed in the year 1970, legalizes: Abortion at any time period Termination of pregnancy under >20 weeks Termination of pregnancy under <12 weeks under medical supervision in cases of rape or threat of life to mother or fetus Performed to get rid of unwanted conception		
4	Infertility implies: Unable to produce a progeny Unable to perform the sexual intercourse Unable to conceive even after 2 years of sexual co-habitation Unable to produce sperm/ova		
5	The country to first launch National Population Policy is: China Russia India U.S.A		
6	Contraceptive techniques are used to avoid: Conception Provide spacing between children To permanently avoid fertility Both (a) and (b)		
7	All of the following are STD's except Syphilis Gonorrhoea HIV/AIDS Fungal Infection		
8	Vasectomy and Tubectomy are: Hormonal method of contraception Temporary method of contraception Permanent method of contraception Natural/Barrier method of contraception		
9	The popular non-steroidal preparation used for contraception is popularly known as once-a week pill. What is it called as? Sakhi		

	Saheli Antara Chhaya		
10	All of the following are measures of reproductive health of the country except: Infant Mortality Rate Maternal Mortality Rate Death Rate Total Fertility Rate		
	PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50		
11	What is reproductive and sexual health? Explain the key difference and elaborate on the importance of the same.	Differentiate Define Explain	Remember
12	Why is Family planning, sexual health and maternal health core components of reproductive health? Explain in detail.	Define Explain	Remember
13	A. List various methods of contraception and elaborate any two methods in detail. B. Briefly explain amniocentesis and the laws pertaining to the ban of this technique.	Explain and illustrate	Remember
14	Apply health belief model and illustrate how it can be used to improve adoption to contraception methods by the general public.	Illustrate	Skill Understand and apply
15	Discuss in detail the reproductive programs run by the govt. of India for the welfare of an individual's reproductive health.	Discuss and explain	Understand

SEMESTER - III					
Course Code	Course Name	L	T	P	Credits
EPH203-DSE3	Environmental and Occupational Health	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 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, Basic Definitions used in Environmental Sciences, Ecosystems, Environmental issues in India , Environmental Issues in Global level, Scope Of Environmental Health. Amelioration of Environmental pollution , policies and governance associated to address environmental issues	12
II	Environmental Factors and Human Health Environmental Contributors, Environmental factors that can affect health, WASH, Environmental health and disease transmission, Healthy Environment, 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 Occupational health and Safety, Definition, Concept, Types of Occupational Health Hazards, Determinants Of Occupational Health, Occupational Health And Service Infrastructure, 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, Hospital Waste Management,	12
IV	Water, Air and Soil pollution and pollutant,	12

	Water Pollution, Water Contaminants, and Standard of water for public usage according to several regulatory agencies. purification of the water, Waste(Solid, liquids) Disposal, Water And Health, Ground Water Contamination, Groundwater Remediation, Disposal Of Industrial Effluents, Air Pollution, Global Air Pollution Issues, Health Effects Of Air Pollutants, Housing Affecting Health, Environmental Health Problems Through Soil	
V	<p>Fundamentals of health issues and remediation due to environmental toxicants and toxic substances</p> <p>Public health emergency and outbreak due to environmental toxins(Fish, algal toxins), Case study of several toxins associated health issues (Cigutaera, histamine, Bravitoxin, saxitoxin etc), public health case study of heavy metals toxicity, public health issues of snake bite, Public health issues of herbicides, insecticides, weedicides, pesticides etc. Public health issues of Antibiotics residues,</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). Anthropro-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 occupational health. CRC Press. 9) Mackay, D., &Boethling, R. S. (Eds.). (2000). Handbook of property estimation methods for chemicals: environmental health sciences. CRC press. 10) Brulle, R. J., & Pellow, D. N. (2006). Environmental justice: human health and environmental inequalities. Annu. Rev. Public Health, 27, 103-124. 11) Salvendy, G. (2012). Handbook of human factors and ergonomics. John Wiley & Sons. 12. Colborn, T., vomSaal, F. S., & Soto, A. M. (1993). Developmental effects of endocrine-disrupting chemicals in wildlife and humans. Environmental health perspectives, 101(5), 378. 13. Frumkin, H. (2001). Beyond toxicity: human health and the natural environment. American journal of preventive medicine, 20(3), 234-240. 31 14. Kampa, M., & Castanas, E. (2008). Human health effects of air pollution. Environmental pollution, 151(2), 362-367. 15. Harrington, J. M., & Gill, F. S. (1983). Occupational health. Blackwell Scientific Publications. 16. Last, J. M., Abramson, J. H., & Freidman, G. D. (Eds.). (2001). A dictionary of epidemiology (Vol. 141). New York: Oxford University Press. 17. Bureau of Indian standards (BIS). (2007). Occupational health and safety management system: requirements with guidance for use, Standard 18001:2007. 	

	<p>BIS,India. https://labour.gov.in/sites/default/files/SafetyHealthandEnvironmentatWorkPlace.pdf</p> <p>18. Saha RK. Occupational Health in India. Ann Glob Health. 2018 Aug 31; 84(3):330-333. doi: 10.29024/aogh.2302. PMID: 30835384; PMCID: PMC6748231.</p> <p>19. National Occupational Safety and Health (OSH) Profile Prepared by: Directorate General Factory Advice Service and Labour Institutes in collaboration with International Labour Organization (ILO) https://dglasli.gov.in/sites/default/files/service_file/Nat-OSH-India-Draft%281%29.pdf</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 (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

h. 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

SEMESTER - III					
Course Code	Course Name	L	T	P	Credits
EPH203DSE 3	Molecular Epidemiology	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 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. Principles of Molecular Techniques: . Different types of PCR (including Primer Design). Different types of finger printing techniques (RFLP and etc.) for genotyping. DNA Cloning (recombinant DNA technology) , Gene Editing with special focus on CRISPAR	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 level -1 Nucleotide and protein sequence retrieval and analyses (NCBI, BLAST, ORF finding, restriction site finding, SWISSPROT, UNIPROT) , 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;	12

IV	<p>Bioinformatics level-2 R programming, Linux, Whole genome data, RNA SEQ data visualisation, Quality control of RNA-Seq data using trimmomatic, Quantification of RNA-Seq data using Salmon, identification of Differentially expressed (DE) and alternative splicing (DAS) genes using R based tools, Introduction to Ensembl, Exploring genomic regions Ensembl genes and transcripts Variation and VEP Comparative genomics in Ensembl (gene trees, orthologues and whole genome alignments), Regulation Genome Assembly & sequencing Algorithms Variant analysis and Variant Annotation tools databases & Genome analysis tools, genome wide association studies , Weighted Gene Co-expression network Analysis with immuoinformatics data retrieval and visualizations, Tools for humoral immunity, Tools for cell mediated immunity- MHC binders Tools for CMI - antigen processing and cytokines Designing adjuvant and managing toxicity</p>	16
V	<p>Molecular techniques in public Health research Tools and techniques for Proteomics : 2-D Gel electrophoresis, HPLC, Mass spectrometry , Proteomics and its application in One Health</p>	12

Tasks and Assignments:

Each student is required to submit the following:

- ✓ Case study regarding the molecular epidemiological study on One Health perspective
- ✓ Case study regarding AMR and determinants of AMR

References:

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 enroll for the course with the link provided below. The course is offered on Future Learn.

<https://www.futurelearn.com/courses/introduction-to-bacterial-genomics>

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

h. Model Question Paper

Part – A: Objective Type			
Sl. No.	Multiple choice 10 x 1 = 10	Specification	Level
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?	Define	Understand
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 - IV

SEMESTER IV					
Course Code	Course Name	L	T	P	Credits
EPH2041	Research Project/ Dissertation				

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: <ul style="list-style-type: none"> ✓ Seminar presentations on literature review and methodology ✓ Final dissertation presentation ✓ Submit a 3000–5000-word draft research paper based on dissertation

	<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). Student’s Name / Month and Year of Completion. Certificate (explaining that the work is original and not submitted/published elsewhere) - annexure III. Acknowledgements (of people who contributed to the shaping of your research report) Table of contents, List of Tables, List of Figures, List of abbreviation used and Preface</p>
	<p>Chapter (s) Abstract Introduction Review of literature, Research Methodology Result: Data analysis and interpretation Discussion Summary and Conclusion 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

a. 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:						

b. 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

SEMESTER - IV					
Course Code	Course Name	L	T	P	Credits
EPH204–DSE4	Public Health in Action	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 role of cross disciplinary approach to define the health of the community.	Understand
CO 2	To apply the cutting edge public health evaluation techniques and ethics involved	Apply
CO 3	Critically analyse the application of public health evaluation tools to understand global health	Analyse
CO 4	Devising prevention and control strategy for disease based on the Evidence based public health and	Create
CO 5	Hands on experience on management of community health during emergency	Skill

b. Syllabus

Units	Content	Hrs.
I	Integrating cross disciplinary approaches for public health Fundamentals of social and behavioral science for health, Environment and health, gene and health, Case study of Social epidemiology, analysis of genetic association studies, Climate change and health, spatial epidemiology, One health perspective of emerging and reemerging diseases. Case study in public health	12
II	Evidence based public health Frame work of EVBPH, difference between EVBPH and EVBM Communicating research into public health Application of epi methods according to public health situations, data collection and analysis thereof for specific public health issues, health programme evaluation. Workshop series on tools for implementation evidence based approaches in public health, public health informatics, systematic review and meta-analysis, Qualitative data analysis, Quantitative data analysis,	12
III	Globalization and health Strategies of globalization, health impacts of globalization, Diplomacy in health, geopolitical approach to address the health, IHR, Foreign policy relevance to health system and health care model, Industrialized and emerging economy coordination, cooperation, ethics in health care delivery	12

IV	<p>Public health emergency and responses Public health preparedness and response during mass gathering, Role of international health organizations during public health crisis, investigation and management of pandemic with intersectoral approach of health systems of developed, developing and LMIC countries, post disaster health emergency and preparedness</p>	
V	<p>Ethics in delivery of public health Ethics in public health interventions and human rights, ethics in allocation in health, Ethics in screening, Ethics for public health professional</p>	12
	<p>Tasks and Assignments: Each student is required to submit the following:</p> <ul style="list-style-type: none"> ✓ Case study on Evidence based public health ✓ References: <ol style="list-style-type: none"> 1. Brownson, RC; Fielding, J. E; and Maylahn, CM. Evidence-Based Public Health: A fundamental Concept for Public Health Practice. Annu. Rev. Public Health 2009; 30:175-201 2. Jacobs JA, Jones E, Gabella BA, Spring B, Brownson RC. Tools for Implementing an Evidence-Based Approach in Public Health Practice. Prev Chronic Dis 2012; 9:110324. 3. Jan K Carney. Public Health in Action: Practicing in the Real World: Practicing in the Real World, Jones & Bartlett Learning; 1st edition (March 9, 2006) 4. Brès, P. L. J & World Health Organization. (1986). Public health action in emergencies caused by epidemics: a practical guide / prepared by P. Brès. World Health Organization. https://apps.who.int/iris/handle/10665/40721 5. Rennie, Drummond, Meade, Maureen , Guyatt, Gordon Cook, Deborah Users' guides to the medical literature : a manual for evidence-based clinical practice, Philadelphia McGraw Hill Education Medical, 2015 6. Nelson, Kenrad E., Williams, Carolyn Masters. Infectious disease epidemiology : theory and practice, Jones and Bartlett, 2014 	

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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h. Model Question Paper

Sl. No.	Model Questions	Specification	Level
	Part – A: Objective Type Multiple choice 10 x 1 = 10		
1	The first country which socialized medicine is A. England B. Russia C. Germany D. Ukraine	Recognize	Remember
2	The following is an important public health event with respect to Health promotion: A. Jakarta Charter B. Belmont Report C. Alma Ata Declaration D. Helsinki Declaration	Recognize	Remember
3	Millennium Development Goals were set to meet targets by: A. 2010 B. 2011 C. 2020 D. 2015	Recognize	Remember
4	The following are the 5 Ps of Sustainable Development Goals's except A. People B. Peace C. Preservability D. Prosperity	Recognize	Remember
5	Indian Meteorological Department (IMD) is located at all of the cities except: (a) Delhi (b) Chennai (c) Mumbai (d) Kolkata	Recall	Remember
6	The concept of Primary Healthcare was first time introduced in: (a) Millennium Development Goal no 3 (b) Alma Ata declaration (c) Jakarta Declaration (d) Health for All by 2000	Recognize	Remember

7	<p>Match the following:</p> <table border="0"> <tr> <td style="text-align: center;">Multilateral Organization</td> <td style="text-align: center;">and</td> <td style="text-align: center;">Headquarters</td> <td></td> </tr> <tr> <td>1. Food Agriculture Organization</td> <td></td> <td>(i) Washington DC, USA</td> <td></td> </tr> <tr> <td>2. United Nations Development Programme</td> <td></td> <td>(ii) Rome, Italy</td> <td></td> </tr> <tr> <td>3. International Labor Organization</td> <td></td> <td>(iii) New York, USA</td> <td></td> </tr> <tr> <td>4. World Bank</td> <td></td> <td>(iv) Geneva, Switzerland</td> <td></td> </tr> </table> <p>Choose the correct option: (a) 1(i), 2(ii), 3(iii), 4(iv) (b) 1(ii), 2(iii), 3(iv), 4(i) (c) 1(iii), 2(ii), 3(iv), 4(i) (d) 1(iv), 2(iii), 3(ii), 4(i)</p>	Multilateral Organization	and	Headquarters		1. Food Agriculture Organization		(i) Washington DC, USA		2. United Nations Development Programme		(ii) Rome, Italy		3. International Labor Organization		(iii) New York, USA		4. World Bank		(iv) Geneva, Switzerland		Recall	Analyses
Multilateral Organization	and	Headquarters																					
1. Food Agriculture Organization		(i) Washington DC, USA																					
2. United Nations Development Programme		(ii) Rome, Italy																					
3. International Labor Organization		(iii) New York, USA																					
4. World Bank		(iv) Geneva, Switzerland																					
8	<p>Using Flannel graph as a method of health communication is a type of:</p> <p>(a) Group approach (b) Individual approach (c) Mass approach (d) None of the above</p>	Recognise	Remember																				
9	<p>The pattern of interrelations between persons in a society is called</p> <p>(a) Social stratification (b) Social structures (c) Caste system (d) Herd structure</p>	Identify	Remember																				
10	<p>INSAT disaster warning system (INSAT-DMWS) is located at:</p> <p>(a) Vishakhapatnam (b) Pondicherry (c) Coast of Andaman and Nicobar Island (d) Coast of Gujarat</p>	Identify	Remember																				
	<p>PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50</p>																						
11	<p>Explain emerging and re-emerging diseases in the context of One health in detail.</p>	Explain	Understand																				
12	<p>What are ethics in public health research? Explain the significance of principles of ethics in the context of human and animal-based research.</p>	Differentiate Define	Understand																				
13	<p>A sudden outbreak of a deadly virus has posed public health emergency in your country. Enlist the steps that you would take to manage such public health crisis.</p>	Explain	Skill																				
14	<p>Explain the principles and significance of public health diplomacy with respect to international health.</p>	Define	Apply																				
15	<p>Briefly describe the functioning and role of the following agencies in the context of public health:</p> <p>(a) WHO (b) UNICEF (c) UNDP</p>	Define	Apply																				

Course Code	Course Name	L	T	P	Credits
EPH204P-5	Practical on study designs and operational research for public health			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 several study designs and concepts of operational research for public health	Understand
CO 2	To apply the concept of epi survey methods and operational research for health research.	Apply
CO 3	Analyze the outbreak of the diseases, functioning of health system, delivery of health care innovations in the community	Analyse
CO 4	Create and develop the operational research protocol and synthesize research questions involving robust study designs and	Create
CO 5	Hands on experience on study design, data collection, duration, analysis & interpretation	Skill

b. Syllabus

Unit s	Content	Hrs
I	Case study and or perform an exercise on a Cross-sectional study: Design and analysis of cross-sectional study, sample size and power calculations, STROBE guidelines	12
II	Case study and or perform an exercise on a Case control study: Design, 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	12
III	Case study and or perform an exercise on a 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,	12
IV	Case study and or perform an exercise on 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.	12
V	Case study on Operational research methods for health systems and operations, public health and health innovation: What is operation research/ implementation research, Identifying a problem (Health system, public health and health innovations), ask the good questions, study designs, research methods either quantitative, qualitative or mixed	

	<p>Tasks and Assignments:</p> <p>Each student is required to submit the following: Submission of Record book or report of study design and survey research protocol used in the published literature for diseases of public health concern.</p> <p>References:</p> <ol style="list-style-type: none"> 1. Lee LM. Principles & Practice of Public Health Surveillance Edited by Lisa M. Lee....[et Al]. 3rd ed. Oxford University Press; 2010. 2. Woodward, M. Epidemiology: study design and data analysis. CRC press, 2013. 3. Rothman J, Erlich J, Tropman JE. Strategies of community intervention. 7th ed. Peosta, Iowa: Eddie Bowers Pub.; 2008. 4. Kelsey JL, Whittemore A, Evans AS, Thompson WD. Methods in observational epidemiology. Second edition. New York: Oxford University Press; 1996. 5. Jekel JF, Jekel JF. Epidemiology, biostatistics, and preventive medicine. 3rd ed. Philadelphia: Saunders/Elsevier; 2007. 6. Hebel JR (John R, McCarter RJ, McCarter RJ. A study guide to epidemiology and biostatistics. 7th ed. Place of publication not identified: Jones & Bartlett Learning; 2012 7. Greenberg RS, Greenberg RS. Medical epidemiology population health and effective health care. 5th ed. New York, N.Y: McGraw-Hill Education LLC.; 2015. 8. Blaxter L, Hughes C, Tight M. How to research. Fourth edition. Maidenhead, England: McGraw-Hill/Open University Press; 2010 9. Hosmer DW, Lemeshow S, May S. Applied survival analysis : regression modeling of time-to-event data. 2nd ed. Hoboken, N.J: Wiley-Interscience; 2008. 10. Kleinbaum DG, Klein M. Logistic Regression A Self-Learning Text. 3rd ed. 2010. New York, NY: Springer New York; 2010. 11. Schlesselman JJ, Stolley PD. Case-control studies : design, conduct, analysis. New York: Oxford University Press; 1982. 12. Kleinbaum DG, Kupper LL, Nizam A, Rosenberg ES. Applied regression analysis and other multivariable methods. Fifth edition. Boston, MA: Cengage Learning; 2013. 13. Meinert CL. Clinical Trials Design, Conduct and Analysis. Second Edition.Oxford University Press; 2012. 	
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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

c. 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

d. 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 assignment

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

h. Model Questions

PART – B Long Answer The answer should not exceed 1500 words 10x 5 = 50			
1.	Report of visiting a community kitchen	Explain	Understand
2.	Report on the diet formulation at tertiary care hospitals	Understand	Skill
3.	Survival analysis protocol synthesis	Understand	Skill

4.	Multilevel ,modelling protocol synthesis	Illustrate	Apply
5.	Asses the BCC model for obesity control an quasi experimental design	Assess	Skill

SEMESTER -					
Course Code	Course Name	L	T	P	Credits
EPH20 -6	Practical on cross disciplinary approach for public health.			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 cross disciplinary approach for epidemiology infectious diseases	Understand
CO 2	Identify application of different disciplines in emerging, reemerging, and ongoing public health issues.	Apply
CO 3	Critically analyse the application of laboratory, social determinates for sustainable public health	Analyse
CO 4	Create a team of professionals and synthesize protocol for addressing public health emergency and ongoing public health issues.	Create
CO 5	Hands on experience to synchronize and optimize different perspectives of research like laboratory, social science and demography.	Skill

b. Syllabus

Units	Content	Hrs.
I	Case study or hands on exercise about investigation of a food borne outbreak due to infectious origin Design and synthesize the protocol involving Multidisciplinary approach, involving expertise in laboratory, public health, social sciences, and community engagement	12
II	Case study or hands on exercise about investigation of a water borne outbreak due to infectious origin Design and synthesize the protocol involving Multidisciplinary approach, involving expertise in laboratory, engineering, public health, social sciences, and community engagement	12
III	Case study and or hands on exercise on antibiotic residue/ pesticide residue in the environment Design and synthesize the protocol involving Multidisciplinary approach, involving expertise in laboratory, engineering, public health, social sciences, and community engagement	12
IV	Case study or hands on exercise about investigation of a Vector born disease Design and synthesize the protocol involving Multidisciplinary approach, involving expertise in laboratory, engineering, environmental sciences public health, social sciences, and community engagement	12

V	<p>Case study or hands on exercise about investigation of a zoonotic disease of pandemic potential</p> <p>Design and synthesize the protocol involving Multidisciplinary approach, involving expertise in laboratory, environmental sciences public health, social sciences, and community engagement</p>	12
	<p>Tasks and Assignments:</p> <p>Our department students are encouraged to make a team of students from other departments from CUTN and develop research questions, protocol involving cross disciplinary approach for Indian public health issues</p> <p>References:</p> <ol style="list-style-type: none"> 1. Andrew Tony. 2015. Epidemiology Advanced study and practices. Hayle Medical. 2. Epidemiologic case studies. https://www.cdc.gov/training/epicasestudies/index.html (Accessed on 13.07.23) 3. Case studies https://www.publichealth.columbia.edu/info/corporate-partnerships/our-case-studies (Accessed on 13.07.23) 	

	<p>4. Sambrook J and Russell DW. (2001). Molecular Cloning: A Laboratory Manual. 4th Edition, Cold Spring Harbour Laboratory press.</p> <p>5. Kawachi I, Berkman LF, Glymour MM. Social epidemiology. 2 ed. Glymour MM, Berkman LF, Kawachi I, editors. New York: Oxford University Press; 2014.</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 Records 10 marks)	2	2	2	2	2
Part – B (Experiments with Long Answer - 5 x 10 = 50 marks)	10	10	10	10	10-
Total	12	12	12	12	12

g. Rubric for assignment

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

h. Model Question Paper

Experiments and Long Answer The answer should not exceed 1500 words 10x 5 = 50			
1	Develop a protocol for WASH study	Understand	Explain
2	OMICs technique in health research	Understand	Skill
3	Methods of quantify the antibiotics and pesticides residue from agriculture waste or animal products	Understand	Apply
4	Methods of estimation urine/blood parameters of Cardiac disease using PCR	Asses	Skill
5	PCR and Agrasoe Gel electrophoresis	Assess	Skill

Skill Enhancement Course Biostatistics using statistical software

SEMESTER					
Course Code	Course Name	L	T	P	Credits
EPH- SEC 1	Biostatistics using statistical softwares				

- **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 using SPSS	Understand
CO 2	To apply the knowledge of hypothesis testing using SPSS	Apply
CO 3	Analyse data sets using SPSS	Analyse
CO 4	Data manipulation using SPSS	Create
CO 5	To get practical training on different statistical approaches and independently use statistical softwares to address their research question	Skill

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.	12
II	Data manipulation using SPSS: recoding, creating new variable, sorting, filtering and selection of specific data, generating simple frequencies, use of syntax editor.	12
III	Descriptive statistics: calculation of summary measures- mean, median, mode, IQR, and SD, checking normality and outliers checking through graphs.	12
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.	12
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.	12

	<p>Tasks and Assignments:</p> <p>Each student is required to submit the following:</p> <ul style="list-style-type: none"> ✓ Record books weekly once ✓ Data analysis report using SPSS with univariate, bivariate and multivariate analysis <p>References:</p> <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). <i>Mahajan's 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. Andy Field (2017) <i>Discovering statistics using IBM SPSS STATISTICS</i> 8. Robert Ho (2006) <i>Handbook of Univariate and Multivariate Data Analysis with IBM SPSS</i> 9. Bertram K. C. Chan (2016) <i>Biostatistics for Epidemiology and Public Health Using R</i> 	
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Learning outcomes:

At the end of the course, students should be able to get practical training on different statistical approaches. They are expected to learn to select the right statistical approach, and independently use statistical softwares to address their research question

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	8	8	8	8	8	40
Total	20	20	20	20	20	100

e. Mapping Course Outcome with Internal Assessment (60 Marks)

	CO1	CO2	CO3	CO4	CO5
Assignments	6	6	6	5	5
Practical test	6	6	6	6	6
Total	12	12	12	12	12

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 tests 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?	Recall	Remember

	<ul style="list-style-type: none"> e) Mean f) Median g) Mode h) All of the above 		
3	<p>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”</p> <ul style="list-style-type: none"> c) True d) False 	Recognize	Remember
4	<p>In a symmetric distribution</p> <ul style="list-style-type: none"> e) mean>median>mode f) mean<median<mode g) mean>mode>median h) mean<mode<median 	Recognize	Remember
5	<p>Find the 50th percentile value for the below data set "12,16, 17,21, 23, 25, 29,31, 32, 35"</p> <ul style="list-style-type: none"> a)24 b)21 c)31 d)25 	Analyse	Apply
6	<p>From the bar chart, what is the most prevalent sensory impairment among 80 years and over people in USA between 1999-2006?</p> <ul style="list-style-type: none"> e) Balance Impairment f) Visual Impairment g) Hearing Impairment h) Loss of feeling in the feet 	Analyse	Apply
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"> e) Paired t test f) Wilcoxon Signed Rank test g) Mann whitney test h) 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 	Identify	Remember

	d)0		
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		
11	a) What are the different types of data? Give examples. b) List and explain at least FIVE types of data presentation.	Explain, differentiate	Understand
12	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
13	What are the steps involved in deciding appropriate statistical method for research? List the statistical assumptions for parametric tests.	Illustrate	Understand
14	Explain the steps involved in a hypothesis testing using the following example. “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.” Note: Give each step using the example	Apply	Skill
27	Suppose a random variable X has a Binomial Distribution B (20, 0.20) 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 $X \leq 5$	Apply	Skill