



**Master of Public Health - MPH
Regulations 2018
For students admitted from the academic year 2018-19**

**Faculty of Medicine and Health Sciences
SCHOOL OF PUBLIC HEALTH
SRM INSTITUTE OF SCIENCE AND TECHNOLOGY
Deemed to be University u/s 3 of UGC Act, 1956
Kattakulathur-603203**

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1.Short Title and Commencement

These regulations shall be called 'MASTER OF PUBLIC HEALTH REGULATIONS 2018' under SRM Institute of Science and Technology Kattankulathur, Kancheepuram District, Tamilnadu. The same has been placed and approved by the 36th academic council meeting of SRM Institute Of Science and Technology held on 25.10.2017. The regulations shall come into force for the candidates admitted from the academic year 2018-2019 onwards.

2.Eligibility

Candidates seeking admission to the Master of Public Health (MPH) shall be required to possess "Bachelor's degree" with minimum of 55 % aggregate marks in Medicine, Engineering, Dentistry, AYUSH, Nursing, Physiotherapy, Occupational Therapy, Physician Assistant and Veterinary Sciences from a recognized University in India or abroad the candidate is required to produce their state/council's registration certificate namely, AYUSH, Medicine, Dentistry and Nursing for their UG courses during admission

3. Medium of Instruction

English

4. Admission Procedures

4.1 The applicants would have to go through a process of Selection Test for admission to the MPH Program. The Selection Test would include an Aptitude test, written essay and an Interview. Admission to the MPH course would be based on candidates' Selection Test score, the previous academic performance, relevant work experience and participation in extracurricular activities.

4.2 The Management however, reserves the right to select nominated candidates from Government, NGOs and Research institutions only on the basis of an interview.

4.3 Following selection, a candidate would be admitted to the MPH Program, after he/she fulfills all the requisite admission requirements stipulated in the offer of admission. If any candidate fails to fulfil any of the requirements within the stipulated time, the Management reserves the right to offer the seat to the next candidate on the waiting list. The decision of the Management Committee would be final in this respect.

4.4 Admission cutoff date shall August 31st of every academic year

5. Commencement of course

July Second Week of every academic year

6. Structure of the MPH Programme

6.1 The MPH program is a full time course for two academic years.

6.2 The First year of the course is common for all the students and consists of two semesters. All students have to successfully complete the core modules during these two semesters. The core modules are

- Social and Cultural aspects of health
- Epidemiology
- Infectious and Non Communicable Diseases Epidemiology
- Fundamentals of Biostatistics
- Population Sciences
- Health Care Systems and Policies

- Women, Child Health and Gender Issues
 - Public Health Nutrition and Food Safety
 - Health Economics and Health Care Financing
 - Environmental Health and Sustainable Development
 - Health Promotion and Behavior Change Communication
 - Research Methodology
- 6.3** Working Days: The program will have a minimum of 100 working days per semester
- 6.4** During the second year (third semester), the students would choose any one of the specializations offered by the School of Public health. The specializations currently offered are:
- Health management
 - Biostatistics

The Second year would consist of course work in the chosen specialization and field work for 6 months. The Students have to make a presentation of their Internship Report and defend it in an open forum. The Evaluation Committee of the School of Public Health, consisting of the minimum an external and one internal member who would evaluate the report based on written documents and its defense. The decision of the Evaluation Committee on the report would be final.

6.5 Exemptions from Course

6.5.1 A student, who has not secured the pass mark or does not attend the module, has to complete the modules during the subsequent semesters.

6.5.2 A student is ordinarily expected to complete the MPH programme in four semesters and extendable to a maximum of 8 semesters.

6.6 Faculty Advisor/Mentor - To help the students in planning their courses and for getting general advice on the academic issues the school will assign faculty advisors to each student admitted to the MPH course.

7. Administration Committees

7.1 Advisory Board: This committee constituted by the Vice Chancellor would be meet every three years to play an advisory role for development and future directions of the School. To also conduct periodic review of curricula and Training and Research activities

7.1.1 The committee would send the recommendations to the VC. The Advisory Board would consist of the Registrar, Director of the medical and health faculty, Dean SPH and three external experts, one of whom would chair the Board.

7.1.2 The board may invite any faculty / institutional member as a special invitee

7.2 Board of studies: Board of studies consisting of academic experts in public health from outside the university and within the university. There will be the constitution of a separate Board of Studies for individual programs of the School of Public Health. The responsibilities of the board are:

7.2.1 This committee would meet as and when there is a modification / Addition / Revision in the curriculum.

7.2.2 To discuss and recommend the issues related to curricula and syllabi Discuss issues related to the initiation of new courses

8 Registration/ Enrolment Process

- 8.1 Students are enrolled after they pay the prescribed fees. Registration and enrollment will be controlled by the office of the School of Public Health. For a student to attend classes he/she has to complete both registration and enrollment. All students shall formally register for the courses every semester to undergo course work.
- 8.2 From the second semester onwards all students have to enroll on a specified day at the beginning of a semester. A student will be eligible for enrollment only if he/she satisfies Registration requirements and will be permitted to enroll only if he/she has cleared all dues to the University, Hostel, Library etc. up to the end of the previous semester, and he/she is not debarred for enrollment by a disciplinary action of the University.
- 8.3 The registration sheet contains the course number, course name, number of credits and category for each course taken in that semester. The student makes the choice of course in consultation with his/her Faculty adviser.

9 Curriculum with Subject Codes

Subject Code	Name of the Course	L	T	P	C
Semester - I					
PH18101	Infectious and Non-Communicable Disease Epidemiology	3	0	2	4
PH18102	Epidemiology	4	2	2	6
PH18103	Fundamentals of Biostatistics	4	1	3	6
PH18104	Population Sciences	3	1	1	4
PH18105	Social and Cultural Aspects of Public Health	3	1	1	4
PH18106	Health Care Systems and Policies	3	1	1	4
	Total credits				28
Semester - II					
PH18201	Research Methodology	3	0	6	6
PH18202	R Programming	1	1	1	2
PH18203	Women, Child Health and Gender Issues	3	2	0	4
PH18204	Health Economics and Health Care Financing	3	2	0	4
PH18205	Environmental Health and Sustainable Development	3	1	1	4
PH18206	Public Health Nutrition and Food Safety	3	1	1	4
PH18207	Health Promotion and Behavior Change Communication	3	1	1	4
	Total credits				28
Semester - III					
Specialization: Health Management					
PH18301	Results Based Project Management	3	2	0	4
PH18302	Public Health Informatics	3	1	1	4
PH18303	Quality Assurance and Total Quality Management	3	2	0	4
PH18304	Public Health Emergency Preparedness and Management	3	1	1	4
PH18305	Public Health Planning, Monitoring, Evaluation, and Governance	5	1	1	6
PH18306	Logistics and Supply Chain Management	3	1	1	4
	Total credits				26
Specialization: Biostatistics					

PH18301	Results Based Project Management	3	1	1	4
PH18303	Public Health Informatics	1	1	1	2
PH18331	Regression Analysis	3	1	1	4
PH18332	Categorical Data and Survival Analyses	4	2	1	6
PH18333	Applied Multivariate analysis	4	1	1	6
PH18334	Nonparametric Methods	1	1	1	2
PH18335	Systematic Reviews and Meta-analysis	1	0	2	2
PH18336	Spatial statistics	2	0	2	3
PH18337	Data Analytics using SAS	1	1	3	3
Total credits					32

Semester IV – Internship

SN	Subject Code	Name of the Course	L	T	P	C
1	PH18401	Research Study (Summer Internship Study)	0	0	16	8
2	PH18402	Internship / Project work	0	0	40	20
Total Credits						28

10. Discipline

Every student is required to maintain discipline and respectable behavior both inside and outside the University campus and not to indulge in any activity that will tend to bring down the prestige of the University

11. Attendance

11.1 Attendance is the physical presence of the student in the class. It is a well observed fact that the students who score good grades are those who attend classes regularly. Therefore, the students must strive to attend all the classes without fail.

11.2 A student who has an attendance lower than 75% whatever may be the reason for the shortfall in attendance will not be permitted to sit for the examination both internal and external unless the student completes course work/assignment as suggested by the faculty in charge of the module/course in which the shortfall exists.

12. Condonation of Lack of Attendance:

Condonation of shortage of attendance upto a maximum of 10% in the prescribed eligible attendance for admission to the University Examination rests with the discretionary power of the Vice Chancellor. For Valid reasons, a candidate lacking in attendance may submit an application in the prescribed form and remit the stipulated fee 15 days prior to the commencement of the theory examination. The Head of the Institution should satisfy themselves on the reasonableness of the Candidate's request while forwarding the application with their endorsements to the Controller of Examination who would obtain the Vice-Chancellor's approval for admission of candidates to the University Examination.

13. Maximum Duration of Course:

Maximum to complete the course in 4 years from the date of his / her admission

14. Assessment Procedure – Tests and Examinations

14.1 From time to time, the Academic Council of the university will decide the system of tests and examinations in each semester. MPH course follows modular teaching and the assessment would be based on 20 % internal assessment and 80 % semester exam.

S. No	Internal Assessment(IA) Tool	Marks (20)
IA 1	Class Participation/ Assignments/ Presentations / Seminars	10
IA 2	Class Participation/ Assignments/ Presentations / Seminars	10
	Total	20

However, for the following modules, internal exam will be conducted for 100% marks

- PH18201 - Research Methodology
- PH18202- R Programming
- PH18301 –Results Based Project Management
- PH18337 - Data Analytics using SAS
- PH18401 Research Study (Summer Internship Study)

Output for Respective Teaching Modules

Code	Modules	Expected outcome
PH18201	Research Methodology	Research Proposal
PH18202	R Programming	Computer Lab exercises and Lab Records
PH18301	Results Based Project Management	Proposal for public health projects
PH18337	Data Analytics using SAS	Computer Lab exercises and Lab Records
PH18401	Research Study (Summer Internship Study)	Manuscript based on Research studies

14.2 Module exam: At the end of each module the faculty would conduct the internal exam. The exam pattern would be decided by the course faculty based on writing exam / presentation / group work / project report.

15. End of Semester Examination

15.1 Eligibility for appearance should have obtained required attendance in all the courses

15.2 There will be one end semester examination of 3 hours duration in each lecture based Course/module. The Semester exams are normally held in the months of November / December and May / June of every Academic year.

15.3 Practical: Since MPH is a field based course in the community, Fieldworks and field related activities are considered to be as practical for the course work credit calculations.

16. End of Semester Exam Pattern

The question paper will uniformly cover all units of the subject as per curriculum.

Max Marks - 80 Marks

Hours: 3 Hours

Part A: Answer any Five questions

(8x5=40 marks)

This part should have **Nine** questions and the students will answer any **Eight** questions. Student's knowledge will be tested along with her/ his Analytical ability. The answers should be 15-20 sentences long.

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.

Part B: Answer any TWO questions

(2x20=40 marks)

This part should have **Three** questions and the students will answer any **Two** questions. Student's knowledge in theory as well as in application will be tested in this part. The questions in this part may be a single question carrying twenty marks or it may have two questions each carrying ten marks. The answers for these ten marks should be in twenty five to thirty sentences.

- 7.
- 8.
- 9.

17. **Evaluation Method:** University exam answer book will undergo single evaluation

18. **Passing Minimum:** To pass in any course it is mandatory that a student should get 50 % marks in the end semester examination and also 50% marks, overall, in the internal assessment and end semester marks put together

Internal mark	University Exam		Total	
	Min	Max	Min	Max
20	40	80	50	100

Modules Mark Distribution						
Subject Code	Name of the Course	Internal mark	University Exam		Total	
			Min	Max	Min	Max
Semester - I						
PH18101	Infectious and Non-Communicable Disease Epidemiology	20	40	80	50	100
PH18102	Epidemiology	20	40	80	50	100
PH18103	Fundamentals of Biostatistics	20	40	80	50	100
PH18104	Population Sciences	20	40	80	50	100
PH18105	Social and Cultural Aspects of Public Health	20	40	80	50	100
PH18106	Health Care Systems and Policies	20	40	80	50	100
Semester - II						
PH18201	Research Methodology	100	-	-	50	100
PH18202	R Programming	100	-	-	50	100
PH18203	Women, Child Health and Gender Issues	20	40	80	50	100
PH18204	Health Economics and Health Care Financing	20	40	80	50	100
PH18205	Environmental Health and Sustainable Development	20	40	80	50	100
PH18206	Public Health Nutrition and Food Safety	20	40	80	50	100
PH18207	Health Promotion and Behavior Change Communication	20	40	80	50	100
Specialization: Health Management						
PH18301	Results Based Project Management	100	-	-	50	100
PH18302	Public Health Informatics	20	40	80	50	100
PH18303	Quality Assurance and Total Quality Management	20	40	80	50	100
PH18304	Public Health Emergency Preparedness and Management	20	40	80	50	100
PH18305	Public Health Planning, Monitoring, Evaluation and Governance	20	40	80	50	100
PH18306	Logistics and Supply Chain Management	20	40	80	50	100
Semester III						
Specialization: Biostatistics						
PH18301	Results Based Project Management	20	40	80	50	100
PH18303	Public Health Informatics	20	40	80	50	100
PH18331	Regression Analysis	20	40	80	50	100
PH18332	Categorical Data and Survival Analyses	20	40	80	50	100
PH18333	Applied Multivariate analysis	20	40	80	50	100
PH18334	Nonparametric Methods	20	40	80	50	100
PH18335	Systematic Reviews and Meta-analysis	20	40	80	50	100
PH18336	Spatial statistics	20	40	80	50	100
PH18337	Data Analytics using SAS	100	-	-	50	100

Semester IV – Internship						
PH18401	Research Study (Summer Internship Study)	100	-	-	50	100
PH18402	Internship / Project work	20	40	80	50	100

19. Promotion credential

- 19.1 He/She can carry all the subject to the next higher semester till the final semester
- 19.2 The student should have registered for the previous semester examinations and attended at least one of the semester Examinations conducted by the University.
- 19.3 In case the student does not meet the above requirements he/she shall follow the re-admission procedure of the university

20. Project Work / Internship Report

- 20.1 Project work / Internship shall be carried out during the IV semester of the MPH course under the supervision of a faculty supervisor/guide from the school allotted by the Dean. In addition to this one supervisor/guide for the field organization would be identified as an external guide in consultation with the internal supervisor
- 20.2 The Project work / Internship shall be pursued for 5 months. The topic and design of the Project Report / Internship Report would be developed with the help of internal and external guides.
- 20.3 One hard bound and soft copy of dissertation report would be submitted after duly signed by both the supervisor(s) to Dean, School of Public Health.
- 20.4 The evaluation of the project/Internship will be based on the report and a viva voce examination on the project.
- 20.5 Successfully completion of the Internship will determine the completion of the IV semester. In the likelihood of the evaluation committee not being satisfied with the Project/ Internship work, an extension of 3 months will be mandated at the end of which the student will have to defend his/her work in front of the evaluation committee. Unsatisfactory performance once again will result in repeating the IV semester. Such recommendations will be communicated to the Controller of Examinations.

21. Project/Internship Marks allocation

S. No	Assessment Tool	Marks (100)
1	Internship monthly progress reports(5 reports 4 marks each)	20
2	Internship Presentation	50
3	Internship Report	30
Total		100

- 21.1 The deadline for submission of final project / Internship report would be communicated before leaving for the field work.

21.2 If a candidate fails to submit the project report / Internship report on or before the specified deadline, he / she is deemed to have failed in the project work / Internship and shall re-enroll for the same in a subsequent semester after obtaining permission from the Dean

22 Grading of Students

Letter Grades and Grade Points (GP) are earned by the student for each course based on the aggregate of marks obtained through internal assessments and end –semester final examination. The letter grades and the corresponding grade points, as recommended by UGC, are as follows.

Letter Grade	Grade Points	Range of Total Marks
0 (Outstanding)	10	90 to 100
A+ (Excellent)	9	80 to 89
A (Very Good)	8	75 to 79
B+ (Good)	7	70 to 74
B (Above average)	6	65 to 69
C (Average)	5	60 to 64
P Pass	4	50 to 59
F (Fail)	0	<50 Failure due to insufficient marks in the course
Ab (Absent)	0	Failure due to non-appearance in examination

22.1 A student is considered to have successfully completed a course and earned the credits if he/she secured a letter grade other than 'F' or 'Ab' in that course. A letter grade 'F' or 'Ab' in any course implies a failure to have completed the course.

22.2 A course successfully completed cannot be repeated

23 Grade Card

23.1 The grade card issued by the Controller of Examinations to each student, after the announcement of the result will contain the following:

- The credits for each course registered for that semester.
- The letter grade obtained in each course
- The total number of credits earned by the student up to the end of the semester in each of the course categories
- The Semester Grade Point Average (SGPA) and the Cumulative Grade Point Average (CGPA) of all the courses taken from I semester onwards.

23.2 Computation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA)

- SGPA will be calculated according to the formula:
$$SGPA = \frac{\sum_1^n C_i \times (GP)_i}{\sum_1^n C_i}$$

Where C_i = credit for the i^{th} course, $(GP)_i$ = the grade point obtained for the i^{th} course n = total number of courses and the sum is over all the course taken in that semester, Including those in which the student has secured F grades.

b. CGPA (Cumulative Grade Point Average) is calculated using: $CGPA = \frac{\sum_1^r S_i \times (SGPA)_i}{\sum_1^r S_i}$

Where S_i = sum of credit in i^{th} semester, $(SGPA)_i$ = semester Grade Point Average earned i^{th} semester and r = number of semesters and the sum is over all the semesters under consideration.

c. The SGPA and CGPA shall be rounded off 2 decimal points and reported in the transcripts.

23.3 Class/Distinction will be awarded to the students after they successfully complete the MPH Programme as per the norms stipulated in the following table:

Category	CGPA (From I-IV Semesters)	Class/ Distinction
Students who successfully completed the MPH programme within the time duration of 4 semesters	≥ 4.0 & < 5.5	Pass
	≥ 5.5 & < 6.0	Second Class
	≥ 6.0 & < 8.0	First Class
	≥ 8.0 (without F or temporary withdrawal in any semester)	First Class with Distinction.
	< 8.0 (without F in any semester but obtained pass grade (O to P) subsequently)	
Students who cannot complete the MPH programme in 4 semesters but complete it successfully within the time duration of 5 semesters	≥ 4.0 & < 5.5	Pass
	≥ 5.5 & < 6.0	Second Class
	≥ 6.0	First Class
Students who cannot complete the MPH programme in 5 semesters but complete it successfully within the maximum duration	≥ 4.0 & < 5.5	Pass
	≥ 5.5	Second Class

24. Re-Totaling of Answer Scripts

Re-totalling of answer scripts will be allowed as per University regulations.

25. Change of Regulations

Any regulation can be modified by the Academic Council of SRM Institute of Science and Technology once in every 3 years.

PH18101 - Infectious and Non-Communicable Disease Epidemiology

Course No	Name of the Course	L	T	P	C
PH18101	Infectious and Non-Communicable Disease Epidemiology	3	0	2	4

Unit1: Public Health Burden of diseases

Disease burden, Classification of diseases, Public Health prioritization of diseases. Criteria for setting Public Health priority for disease control and prevention, Concept of Epidemiological transition, Morbidity.

Unit2: Infectious disease Epidemiology

Concept of Infection, Virulence, Pathogenicity, Routes and modes of transmission, Interrupting Chain of Infection Epidemiological triad, Concepts of Principles of Disease control and Prevention, levels of prevention, Disease Elimination and Eradication, Public Health approach to control of infectious diseases, Attack rate and Secondary attack Rate, One Health concept

Unit 3: Disease control Programmes

Biological and epidemiological basics of Malaria, TB, STI, HIV-AIDS, National health program need and importance- National and Global, case studies of various national programs in India-National Vector Borne Disease control Programme, Revised National Tuberculosis Control Programme, National AIDS Control Programme, National Leprosy control Programme, strategies adopted.

Unit4: Principles of Non Communicable Disease control

Epidemiology of Non communicable diseases, challenges of Non communicable disease, Iceberg phenomenon, Screening of disease, Quaternary Prevention concept and application of Non communicable disease, Life style diseases, WHO action plan on Non communicable disease, Injury epidemiology and Prevention

Unit 5: Risk Factor Epidemiology of important NCDs

Modifiable and Non modifiable Risk factors, Evaluation of Risk factor for chronic disease like Cardio vascular disease, Hypertension, Diabetes, Cancer, Stroke, Oral Health. Holistic approach to Control of Common risk factors, Cancer Control programme, Blindness Control programme, Epidemiology and prevention of Injuries, Road Traffic Accidents,

Text books :

1. Textbook of Public Health and Community Medicine -Raj VirThalwar. First edition, -AFMC & WHO, 2009
2. Global status report on non communicable diseases -World Health Organization -Chapter 2-4, WHO, 2010

Reference books:

1. Burden of Disease in India National Commission on Macroeconomics and Health, 2008
2. Equitable development and health future. Chapter on Disease Burden in India estimation and Causal Analysis. MOFW, GOI, -Ministry of Health and Family Welfare, Government of India, 2005
3. Communicable disease Epidemiology and control A global perspective. -Roger Weber-CABI Publisher Chapter 1-4. 2009
4. Epidemiology, Biostatistics, Preventive Medicine, and Public Health-Katz DL, Wild D, Elmore JG, Lucan SC. Jekel's 4th Edition. -Saunders, 2013
5. Oxford textbook of Public Health -Fifth Edition: Detels, McEwen, Beaglehole and Tanaka,-Oxford University Press, 2011

PH18102– Epidemiology

Course No	Name of the Course	L	T	P	C
PH18102	Epidemiology	4	2	2	6

Unit 1: Introduction & Principles of Epidemiology

History and Evolution of Epidemiology, Landmark epidemiological achievements, Historical contribution of Epidemiology in making public health Evidence based practice, Association and Causations, Bradford hill criteria for causal evaluation, Time, place and person, Application of epidemiological logic. Bias and Chance

Unit 2: Epidemiological Measures and Public health impact

Incidence measures, prevalence measure, Relationship between Prevalence and Incidence measures Relative Risk, Odds Ratio, Attributable Risk, Excess Risk, Attributable Fraction, Population Attributable risk, Confounding, Types and measurement of Bias, Effects of Bias, confounding and Chance, strategies control of bias.

Unit 3: Epidemiological Study Designs

Cross sectional studies, Observational Studies, Experimental studies, Case control design, Cohort design, Prospective and Retrospective cohort studies, Randomized control Trial, Ecological studies, Advantages and Limitations of various study designs, Rationale of each study designs and its practical application.

Unit4: Principles of Clinical Epidemiology

Concepts in Clinical Epidemiology, Precision, Accuracy and Validity of tests, Types of validity, Sensitivity, Specificity, Positive and Negative Predictive, Type one and Type two errors, strategies to reduce false results, serial testing and parallel testing, Concepts of screening, difference between screening and diagnosis. Natural course of disease

Unit 5: Disease Surveillance and Field Epidemiology

Steps in Epidemic investigation, Case study on outbreak investigation, Principles of Disease surveillance, Types of surveillance, Epidemic and Pandemic Preparedness and Response, Zoonotic diseases, Emerging and Remerging diseases, Field assessment of Health, morbidity and Risk factors.

Text books:

1. Epidemiology Leon Godris, 5th Ed. Saunders Philadelphia 2014
2. Basics of Epidemiology, Bonita & Beaglehole. 2nd Edition -WHO, 2007

Reference books:

1. Clinical epidemiology the essentials. -Fletcher, Robert H., Suzanne W. Fletcher, Edward H. Wagner.LWW; Fifth edition-Lippincott Williams & Wilkins, 2014
2. An Introduction to Public Health and Epidemiology -Susan Carr, Nigel Unwin, Tanja Pless-Mullooli, Second Edition. -Open University Press, 2007
3. Epidemiology, Bio statistics & Preventive medicine -James F. Jekal, David L Katz, Joann G Elmore, Dorothea Wild, 4th edition. -W.B. Saunders company publishers, 2013

PH18103–Fundamentals of Biostatistics

Course No	Name of the Course	L	T	P	C
PH18103	Fundamentals of Biostatistics	4	1	3	6

Unit 1: Fundamentals of Biostatistics

Definition, Types of Statistical Methods, Populations and Samples, Sources, Types and Classification of Data, Measurement Scales, Organization of Data-Frequency Distribution-Graphic Methods, Descriptive Statistics: Measures of Central tendency, Measures of Dispersion and Measures of Skewness and Kurtosis.

Unit 2: Probability and Sampling Distributions

Probability Theory-Trials, Events, Sample Space, Definition of Probability, Mutually Exclusive, Equally likely, Exhaustive Events, and Conditional Probability, Addition and Multiplication Theorems, Independence Events, Simple Problems, Baye's Theorem and its application. Probability Distributions: Binomial, Poisson and Normal distributions and their applications, Central limit theorem and its applications. Sampling Distribution- Definitions of Sampling Distribution and Standard Error, Construction of Sampling Distributions of Mean (s) and Proportion (s).

Unit 3: Statistical Inference I

Point Estimation: Definitions of Point Estimation and Confidence Interval, Fitting of Confidence Intervals for Population Proportion and Mean. Hypothesis Testing: The Logic of Hypothesis; Simple and Composite Hypotheses, Null and Alternative Hypotheses, Type I and Type II Errors, Critical Region, Level of significance, One-tailed and two-tailed tests, P-value, Large and Small Sample Tests, Power of a Test, Steps involved in Testing Statistical Hypothesis.

Unit 4: Statistical Inference II

Large Sample Tests-Hypothesis Testing on Population Proportion(s), Population Mean(s), Simple Applications. Small Sample Tests- Hypothesis Testing on Population Mean(s), Ratio of Two Variances. Test on Independence of Attributes, Simple Applications. Analysis Variance: One-way and Two-way

Unit 5: Correlation and Regression

Correlation-Simple and Multiple Correlations, Rank Correlation and their applications, Test on Significance of Correlation. Simple Linear Regression and Regression coefficients and their properties, fitting of regression lines and simple applications, Test on Significance on Correlation Coefficient and Regression Coefficient.

Text books:

1. Biostatistics-Biostatistics, Student Solutions Manual: A Foundation for Analysis in the Health Sciences- Wayne W. Daniel, 9th Edition-Wiley Series.,2011

Reference books:

1. Introduction to Biostatistics and Research Methods, -Sundar Rao, PSS and Richard, J-PHI Learning Pvt.Ltd., 2006
2. Essentials of Biosatistics in Public Health, -Lisa M. Sullivan, Second Edition-Jones and Barlett Learning, LLC, 2012
3. Biostatistical Analysis, -Jerrald H. Zar, Fifth Edition-Pearson Education, 2009
4. Bio-Statistics: A Manual of Statistical Methods for use in Health, Nutrition and Anthropology, -Vishweswara Rao-JaypeeBrothers Medical Pub., 1996
5. High Yield Biostatistics, Epidemiology and Public Health, -Anthony N Glaser, 4th Edition.-Lippincott Williams and Wilkins, 2013

PH18104 - Population Sciences

Course No	Name of the Course	L	T	P	C
PH18104	Population Sciences	3	1	1	4

Unit 1: Introduction to Population Science and Theories

Meaning, Nature and scope of demography, Population growth, population structure- age structure population characteristics and distribution of population; Components of population change, world population trends and forecasts. Population theories

Unit 2: Population Data and sources

Types of secondary data, population Census, Registration of vital events, sample surveys, Sample registration system, - Quality of data- (Age heaping, Wipple's Index, Myers Index), re sampling- bootstrapping, jackknifing, cross-validation, case studies - DHS, SRS, NFHS, RCH, NSSO

Unit 3: Mortality and Fertility Concepts

Concept and definitions of -Fecundity, fertility.- measures, determinants, Mortality, Mortality measures, Mortality- measures and methods, surveillance, strategies, life tables, Fertility- concepts, determinants, measurements, fertility reduction strategies

Unit 4: Demographic Transition, aging and Development

Demographic transition concepts and theory, concept of labour force, migration- concepts and theories conceptual frame work on migration and health.

Unit 5: Population Projections and Estimations

Population estimation, population projections- small area projections, micro planning, Demographic Analysis in the Planning Process, concept of development of indicators, concepts of indices- human development index, physical quality life index, child status index, Global Health Gap index.

Text Books :

1. Principles of Population Studies. -Asha A. Bhenda and Tara Kanitkar, 16th edition. -Himalaya Publishing House, 2006
2. Demographic Techniques -Srinivasan, K., -Registrar General of India (RGI), Census of India and UNFPA, 2011

Reference books

1. Population Health Research: Linking theory and methods.-Kathryn Dean, Second Edition-Sage, 2003
2. Census of India 2001 and 2011, -Registrar General of India (RGI) -RGI-Online
3. Population projections for India and states-RGI, 2006 RGI

An Introduction to the Study of Population. -Second edition. Mishra B. D., -South Asian Publishers Pvt. Ltd, 1995.

PH18105 - Social and Cultural Aspects of Public Health

Course No	Name of the Course	L	T	P	C
PH18105	Social and Cultural Aspects of Public Health	3	1	1	4

Unit1: Introduction to public Health, Health Seeking Behaviors and Treatment Seeking Behaviors

Definition of Public Health –Physical- Mental and Social Health- Health Access-Health and Treatment Seeking Behaviors- History of Health- Health Equity-Health Inequality -Health Disparities- Determinants of Health and Disease- Health for all movement – Public Health Successes – Primary Health care – Public Health in Developing Countries- Health Education

Unit 2: Perception, Knowledge and Practices in public health

Definitions- Concepts of Perception-Knowledge – Practices - Assessment of Knowledge- Attitudes-Construction of Tools to assess KAP- Empowerment: Male and Female Empowerment – General Principles of Formulating questions – How to Measure concepts- Multidimensional concepts of Health – Positive vs Negative Concepts of Health – Provider vs Patient Concepts of Health – Generic Vs Disease Specific Concepts of Health – Formulating Questions about Behavior: Non threatening questions about behavior- Threatening questions about Behavior – Formulating questions about Knowledge and Attitude.

Unit 3: Social Determinants of Health

Dahlgren Whitehead Model - Ecological Model - Social Determinants of Health: Literacy- Education- Poverty- Occupation, Gender- Income-Social Exclusion- Health Literacy- Migration-Access to Technology-Sexual Orientation- Geography, Politics- Language

Unit 4: Social and Community Health Issues

Tobacco: Use – abuse – Advocacy – Tobacco Control, Alcoholism – use-Abuse-Advocacy- Policy-, Intimate Partner / Family Violence Cycle of Violence- Prevention of Violence- advocacy and Policy-Terrorism: Preparedness and Policy-Disaster Management: Preparedness- prevention and Management

Unit 5: Socio-Cultural Aspects of Public Health

Social change, Social activism, Social Network, Social Support, Social Network. Theories involving Social Activism, Advocacy, Action, Policy Planning, Cultural Aspects of Health, Culture

Text books:

1. Public Health and Community Medicine RajVirThalwar. First edition-AFMC & WHO, 2009
2. Equity, Social Determinants and Public Health Programs,-Blas.E.,Kurup. A.S.-WHO, 2012

Reference books:

1. Health Behavior and Health Education: Theory, Research and Practice. -Glanz, Rimer, Lewis: Jossey Bass 3 Edition, -Wiley, 2009
2. Designing and Conducting Health Surveys: A comprehensive guide-Jossey- Bass – Chapters 8-11, (Third Edition)-Wiley, 2009
3. Oxford textbook of Public Health -Detels, McEwen, Beaglehole and Tanaka, Fifth Edition-Oxford University Press, 2011

PH18106 – Health Care Systems and Policies

Course No	Name of the Course	L	T	P	C
PH18106	Health Care Systems and Policies	3	1	1	4

Unit 1: Introduction to Health systems

Historical development, types and boundaries, Indian health delivery model and standards, Persistent and Widespread Issues In Providing Health Services, Stewardship, perspective on Health sector reforms, Development and Structure of the different Health Care System- poor resource setting

Unit 2: Global Health

Health systems and models of various countries, global health problems and trends- Disparities in Health Care Access and Outcomes, Health Care System in Global Perspective

Unit 3: Alternate systems of health care

Home based care; Community based care system, indigenous systems of medicines, AYUSH, Foundations of health care system design

Unit 4: Health care standards and evaluation

IPHS, WHO's Evaluation of Health System Performance, The WHO A framework for analyzing health systems, Health system and policy research and evaluation: Health systems research, operational research, implementation research, synthesizing and communicating research evidence; four pillar analysis

Unit 5: Health policy and planning

Policies and programs, policy formulation, policy development / assessment process. Frameworks for policy analysis and policy evaluation. Case studies of various public health policies, Policy implementation plans

Text books:

1. Health Policies and Programmes in India-Dr D K Taneja, 12th edition-Doctors' Publication, 2013
2. Better Health Systems for India's Poor: Findings, Analysis, and Options-David H. Peters, Abdo S. Yazbeck, Rashmi R. Sharma, G. N. V. Ramana, Lant H. Pritchett and Adam Wagstaff, -World Bank, 2002
3. Indian Public Health Standards, National Health mission, ministry of Health and Family welfare, -Ministry of Health and Family Welfare -Government of India, 2006

Reference books:

1. Public Health Legislation in India, -Bhatnagar, -Doctors Publication New Delhi, 2014
2. National Health Policy, -GOI, 2000-GOI, 2000
3. Annual Report, Ministry of Health and Family Welfare-Gol , 2010-2014-Gol , 2010-2014
4. Contemporary Public Health: Policy, planning, management-J.P Gupta, A.K. Sood-Apothecaries Foundation, 2005
5. Health Care Systems, Efficiency and Institutions-Isabelle Joumard, Christophe André and Chantal -OECD, 2010
6. Health Care Systems around the world Characteristics, Issues, Reforms-Marie L. Lassey, William R. Lassey, Martin J. Jinks, -Pearson, 1996
7. National Population Policy -Government of India, Ministry of Health and Family Welfare-Gol, 2000

PH18201 – Research Methodology

Course No	Name of the Course	L	T	P	C
PH18201	Research Methodology	3	0	6	6

Unit 1: Research Preparation and Planning

Objectives of research – understanding research and its goals – critical thinking – selecting topic for research – justification and rationale development – research designs – method of scientific enquiry – formulation of hypothesis – writing a research proposal - Sources of information – review of literature – online databases – search tools – effective use of pubmed and other online search engines – impact factor – h index – citation index - systematic reviews – narrative reviews – plagiarism – tools to avoid plagiarism – intellectual property and patents- Ethics of research planning and preparation

Unit 2: Data collection, analysis and inference

Questionnaire design – selection of samples – errors in data collection – data validation process – data entry formats – data entry software – data cleaning and management – basic statistical analysis – estimates and confidence intervals – p values – interpretation and discussion of research findings- Ethics in Data collection

Unit 3: Sampling and Sampling Methods

Definition of sampling – principles of sampling – advantages and disadvantages of sampling – probability and non probability sampling methods – simple random sampling – systematic random sampling – stratified random sampling – cluster sampling – multistage sampling methods – determination of sample size – sampling weights – choosing appropriate sampling methods for research - Ethical issues in sample selection

Unit – 4: Qualitative Research Methods and Participative Rural Appraisal (PRA)

Introduction to qualitative research – Ethnography – Phenomenology – Narrative Enquiry – Focus Group Discussions – In depth Interviews – Recording qualitative interviews – transcription – analysis paradigms – grounded theory methodology – content analysis – discourse analysis – Reflective analysis – Qualitative data analysis software – coding – thematic analysis – conceptual diagram – Participative Rural Appraisal – social mapping – resource mapping – time lines – seasonal charts – ranking – structured observations – Venn diagrams (Chappti diagrams) – Ethical issues in qualitative research

Unit – V: Academic writing and presentations

Proposal writing for obtaining funding – elements of writing style – writing research reports – manuscript preparation for publication – referencing styles – oral presentations – poster presentations – peer review process – thesis writing – Ethical issues in thesis writing

Text books:

1. World Health Organization. Health Research Methodology A guide for training in research methods.-World Health Organization -World Health Organization, 2011
2. Sampling: Design and Analysis. -Sharon L Lohar. Second Edition. -Brooks / Cole Cengage Learning, 2010

Reference books:

1. Designing Qualitative Research: An Interactive Approach.-Maxwell, J, Third Edition-Sage Publications, 2013
2. Qualitative Interviewing: The Art of Hearing Data.-Rubin, H. and I. Rubin-Thousand Oaks, CA: Sage Publications. 2005
3. Research Methods in Health: Investigating Health and Health Services-Second Edition. Ann Bowling. - Open University Press, Buckingham, 2002
4. Fundamentals of Research Methodology for Health Care Professionals. -Second Edition. Hilla Brink, Christa Van der Walt, Gisela Van Rensburg. -Juta and Company Ltd, 2006
5. Writing Ethnographic Field notes. -Emerson, Robert M., Rachel I. Fretz, and Linda L. Shaw. -University of Chicago Press.1995
6. Participatory Rural Appraisal: Principles, Methods and Application. -N Narayanaswamy-Sage Publications Pvt. Ltd. 2009

PH18202 – R Programming

Course No	Name of the Course	L	T	P	C
PH18202	R Programming	1	1	1	2

Unit 1: Introduction

History of R and S, Data types in R, reading and writing data, Obtaining and installing R, Basics, Introduction – Functions and arguments, vectors, Lists, data frames, subset and transform. Sage

Unit 2: R Environment

Session Management, Graphic subsystem, R programming – Flow control, cases and generic functions, Data entry

Unit 3: Basic statistical concepts

Probability and distributions, Descriptive statistics – Summary statistics for a single group, multiple groups, generating tables.

Unit 4: Testing of hypothesis using R

One sample and two sample tests, paired t test, ANOVA, correlation- Pearson correlation, Spearman correlation and Kendal's tau, regression – Simple and multiple regression

Unit 5: Advanced functions of R

Loop functions, Debugging tools, Simulation – Generating random number, Simulating a random model, Random sampling, Profiling.

Books for study

1. R programming for Data science, Roger D Peng, Lean publishing, 2015
2. The art of R Programming, Norman Matloff, No starch press, San Francisco, 2011

Books for reference

1. The R book, Michael J crawley, 2007, John Wiley and sons
2. Software for Data Analysis, Programming with R, John chambers, Springer New York, 2010

PH18203 – Women, Child Health and Gender Issues

Course No	Name of the Course	L	T	P	C
PH18203	Women, Child Health and Gender Issues	3	2	0	4

Unit1: Gender and Health

Gender and social norms; Gender inequalities in health; Masculinity and Femininity; Gender as a System; Patriarchy; Gender autonomy; Gender analysis; Gender Matrix; Gender auditing; Empowerment and status of women; Gender Violence; Law; and Social Justice; Reproductive Rights and Justice.

Unit2: Women's Health

Life cycle approach, Safe Motherhood Initiative; Concepts, definition, measures and models; Maternal morbidity and mortality causes, determinants of MMR; Essential antenatal, perinatal and postnatal care; 3 delay model; Customs, norms, attitudes and practices pertaining to various aspects of women's health like Menstruation, puberty and menopause. Role and involvement of men in RH.

Unit3: Child Health

Common childhood illnesses; Determinants of mortality in children; child development and health indicators; mortality rates; child mortality reduction strategies; immunization; health determinants, health status and wellbeing of children.

Unit4: Adolescent & Sexual Health

Adolescent and Sexual Health relevance and challenges; The determinants of fertility and measurements; WHO 10 core Life Skills; Adolescent Sexuality and Pregnancy; psychological changes; Reproductive Tract Infections; Sexually Transmitted Infections and HIV/AIDS; Health Benefits of Family Planning; Methods of birth control; Contraceptive Behavior; Reproductive Health Indicators - couple protection rate; unmet need of family planning

Unit5: Policies and programs for women and child health

Evolution of MCH and family welfare programs; services under RCH package: RCH I, RCH II, RMNCH+A; IMNCI; Policy Voluntarism vs Coercion; Current trends and status of Family in India; Maternal Benefit schemes; School health programs; ICDS; National programs on women, Child, Adolescent health & gender issues; The maternity benefit act; PNDT Act; MTP Act, Abortion; Sexual and reproductive rights, child rights and legislations. Millennium Development Goals in the context of women and child health.

Text books:

1. Maternal And Child Health Programs, Problems, and Policy in Public Health-3rd Edition by Jonathon Katoch, -Aspen Publications, Maryland, 2007
2. Innovations in Maternal Health, Case Studies from India, -Jaya K. Satia et al, -Sage Publication Ltd, 2014
3. Adolescent and Youth reproductive health in India -Gupta SD-ICMR, 2005

Reference books:

1. What do we mean by Sex and Gender World Health Organization -World Health Organization, 2007-E Book
2. The Lancet Child Survival Series-World Health Organization-WHO, 2003
3. The Lancet Neonatal Survival Series-World Health Organization-WHO,2005
4. The Millennium Development Goals (MDGs)-United Nations Development Program-UNDP, 2000
5. Family Welfare Programme, -Planning Commission-Government of India, 2013

PH18204 – Health Economics and Health Care Financing

Course No	Name of the Course	L	T	P	C
PH18204	Health Economics and Health care Financing	3	2	0	4

Unit 1: Fundamentals of Health Economics

Introduction to health economics, opportunity cost, Goods and services in public health- merit good, public good or social good, actors and institutions in health care, Informational asymmetry and concept of agency, Supplier induced demand, Monopolies and incomplete market, Efficiency- technical efficiency, cost effective efficiency, allocative efficiency.

Unit 2: Demand and Supply for Health Care Services

Marginal Analysis, Cost analysis- catastrophic payments. Equity and equality- health outcomes, Market concept- Concept of demand- Need and demand; Concept of Supply- Analyzing supply and supply shifters, Elasticity of supply, Supply of health services, Interaction of supply and Demand, Effective allocation of society's resources, Consumers' and Producer's surplus, Issues in the interactions of supply and demand in health care days

Unit 3: Economic Analysis

Economic Evaluation of Efficiency, When to use which Technique, Component of Economic Evaluation, QALY, DALY, Measuring health inequalities- Quintile, concentration curve, concentration index, benefit incidence analysis, SES, SES data collection methods, SES scales

Unit 4: Health Care Financing Concepts

How much we are spending, The three functions of health financing, Types of Financing- General revenue, Insurance, Community financing, Out of pocket payment and user fee, External source of finance, Equity, What is Risk-Pooling and Why is It Needed?, The Levels of Risk-Pooling, contracting in, contracting out

Unit 5: Health Financing Models

supply side and demand side financing, General Revenue-Based Systems, Social Health Insurance, Community Health Insurance, Private Health Insurance, resource allocation, Organization of resource allocation, Provider payment methods, Hospital Payment Method, Contracting, The effect of payment systems on patients

Text books:

1. Health Financing Revisited, Pablo Gottret George Schieber, -The World Bank, 2006
2. A primer of Health Economics, -VR Ramankutty-Allied Publishers Pvt. Ltd, 2010

Reference books:

1. HEALTH ECONOMICS, Author: Pushpalata Pattnaik, Black Print/ Wisdom Press, 2010
2. Health Care Economics-7th Edition, Paul J Feldstein-Delmar Cengage Learning, 2012
3. Health care economics and health care management-I Sundar, -Serials Publications New Delhi 2012
4. Essentials of health care financing-I Sundar, -Serials Publications New Delhi 2012

PH18205 - Environmental Health & Sustainable Development

Course No	Name of the Course	L	T	P	C
PH18205	Environmental Health & Sustainable Development	3	1	1	4

Unit 1: Environmental Impact On Human Health

Pollution Types, Health impact of pollution, global environmental concerns, multilateral efforts in reducing environmental degradation

Unit 2: Environmental Epidemiology

Principles of Environment Epidemiology, Environment Risk assessment, Health Impact Assessment, Environmental research methods

Unit 3: Conceptual frame work of Sustainable development

Importance of Sustainability in development, Threats for sustainable development. Challenges in adopting, sustainable strategies,

Unit 4: Sustainable development Goals

Evolution of SDGs, Concept and Rationale for each of SDGs, Implication of SDG for Human development, Ethical basis for SDGs. Efficiency and sufficiency SDGs.

Unit 5: Politics and Economics Sustainable development

Environmental protection and economic growth. Roles private sector and public sector in furthering sustainable development efforts, Challenges in combining sustainability and business success

Text book:

Essentials of Environmental Epidemiology for Health Protection: A handbook for field professionals - Irene A. Kreis et al. First Edition OUP Oxford; 2012

Reference books

1. Environmental Health Criteria. -WHO. 2005-WHO. 2005
2. Topics in Environmental Epidemiology -Steen and Kyle-Oxford University Press 1997
3. New York / London (W.W. Norton) Perman, Roger et al. (2011): Natural Resource and Environmental Economics, 4th ed., Harlow (Pearson)
4. Perkins, Dwight H. / Radelet, Stefen / Lindauer, David L. (2006):Economics of Development, 6th ed.,
5. The Challenge of Sustainability, Global Environment Facility. Washington, D.C: World Bank, 2002.

PH18206 – Public Health Nutrition and Food Safety

Course No	Name of the Course	L	T	P	C
PH18206	Public Health Nutrition and Food Safety	3	1	1	4

Unit1: Principles of Nutrition

Definition of Nutrition –Public Health and Clinical Nutrition- Population Level Nutrition- Dietary requirements – Dietary Guidelines.

Unit 2: Disease / Condition Specific Nutrition

Nutritional Epidemiology – Epidemiologic Methods -Nutrition requirements during various conditions. Goitre – Iron Deficiency Anemia Pregnancy-New-Born- Adolescent – Senior Nutrition requirements – Prevention of Protein Energy Malnutrition – Severe Acute Malnutrition – Micronutrient Malnutrition

Unit 3: Public Health Nutritional Assessment, Monitoring and Evaluation

Community Nutrition: Deficiency and Dietary Management – Undernutrition – Malnutrition – Assessment of nutritional status – anthropometric measurements – clinical examination delay survey –Nutrition in infancies, pregnant and nursing mothers. Monitoring of Public Health Nutrition programs.

Unit 4: Policies and Programs in Public Health Nutrition

Integrated Child Development Services – Adolescent Nutrition Program – Iron and Folic Acid supplementation for pregnant women – Vitamin A supplementation for Children – National Iodine Deficiency Disorder control program – Midday Meals for Primary School children.

Unit 5: Food Safety

General principles of hygiene – importance of food borne illness – prevention of contamination- Food allergies – Importance of safe drinking water – Purification methods – Food Handling at Stalls – Hotels – restaurants – Food Safety and Standards Authority of India(FSSAI).

Text books:

1. Prescribed Text Book: Public Health Nutrition in Developing Countries Vol 1 and 2.-Edited by Sheila Chandra Vir. -Woodhead Publishing India, 2008
2. Text Book of Human Nutrition: -Mahtab S. Bamji, Kamala Krishnaswamy and GNV Brahman. Third Edition, -Oxford& IBH,2009

Reference books:

1. Clinical Nutrition. -Editors: M. Gibney, Marinos Elia, O. Ljungqvist and J. Dowsett-Blackwell Publishing, 2005
2. Mother and Child Nutrition in the Tropics and Subtropics -Journal of Tropical Pediatrics, 2005
3. Nutrition Tool kit#8: Monitoring and Evaluation-World Bank, 2010-World Bank, 2010
4. Adolescent girls' anaemia control programme in Gujarat, India-Indian Journal of Medical Research: 2009
5. Five Keys to Safer Food -World Health Organization-WHO 2010

PH18207 – Health Promotion and Behavior Change Communication

Course No	Name of the Course	L	T	P	C
PH18207	Health Promotion and Behavior Change Communication	3	1	1	4

Unit 1: Fundamentals and Principles of Communication

Definition of Public Health Communication – Fundamentals of Communication – Shannon Weaver Model – Communications Process – Context – Facilitators and Barriers to Communication – Active Listening- Feedback- Verbal and Non Verbal forms of Communication – Written Communication

Unit 2: Behavior

Individual health behavior Models/ Theories - Interpersonal Health Behavior Models and Theories - Social Networks and Social Support. Social Cognitive Theory. Stress, Coping and Health Behavior- Community and Group Models on Behavior Change: Community Organization, Community Building, Community Mobilization, Diffusion of Innovation, Communication Theory and Health Behavior Change. Planning Models: Precede Proceed Model. Ecological Models of health Behavior

Unit 3: Behavior Change Communication and Health Promotion

Behavior Change Communications – Social Change Process – Theories of Behavior Change: Diffusion of Innovation – Evo-Eco Model of Change – Transtheoretical Model of Stages of Change – Motivational Interviewing – Individual health behavior: Interpersonal Health Behavior: Social -Community and Group Models on Behavior Change- Health Behavior Change.- Health Promotion Models

Unit 4: Strategic Communication Development

P Process – C Process – Situational Analysis : Target group identification – Root cause Analysis – SWOT analysis – Audience Segmentation – Audience Prioritization – Audience Profile – Creative Brief – Channel Mix – Channel Identification – Message Creation – Pretesting – Field Testing - Characteristics of Effective Health Communication. – Communications Research – Content Analysis – BEHAVE framework

Unit 5: Health Literacy and Numeracy

Definition of Health Literacy and Numeracy - Facilitators and Barriers of Health Literacy – impact on Public Health - Grade Level: Flesch Kincaid Reading Levels – TOHFLA – SMOG scores – Suitability Assessment of Materials – Cultural and Linguistic Competency

Text books:

1. Essentials of Public Health Communication-Editors: Parvanta Claudia., Nelson. David. E., Parvanta. S.A and Harner, Richard N.-American Public Health Association Press: Jones and Bartlett Learning, 2010

Reference books:

1. Health communication and Behaviour Change communication-Health Communication - A multicultural Perspective. Kar. S and Alcalay, R. and Alex. S. -Sage Publications, 2010
2. Oxford textbook of Public Health -Fourth Edition: Detels, McEwen, Beaglehole and Tanaka, -Oxford University Press, 2009
3. Guide to health promotion and disease prevention -Government of Canada, -2009
4. Field Guide to designing Health Communication-Johns Hopkins University School of Public Health, -2009
5. Communicating Effectively with Patients: The Importance of Addressing Health Literacy and Numeracy - American Association of Diabetes Educators. -2011

Specialization I. Health Management

PH18301 – Results Based Project Management

Course No	Name of the Course	L	T	P	C
PH18301	Results Based Project Management	3	2	0	4

Unit 1: Introduction to Basic Concept of Project Management

Project life cycle, project management process, needs assessment, stakeholder identification, resource mapping, introduction to RBM

Unit 2: Problem analysis, objective analysis and strategy analysis

Problem tree, objective tree, SWOT analysis, Stakeholder analysis, Scoping,

Unit 3: Logical Framework Approach and Tools

Introduction to Log Frame Approach and its Tools, Logical Framework Matrix and conceptual clarity of the format, Hierarchy of objectives and result chain, Means of verification, Assumptions and risks, Theory of Change

Unit 4: Performance Measurement Framework

Introduction to Performance Measurement Framework, Develop PMF at each result level, activity scheduling,

Unit 5: Results Based Reporting System

Developing reporting format to monitor the results at all levels. Developing reports and dissemination of reports to different audiences.

Text Books:

1. Handbook on Project Cycle management, European commission, version 2.0, 2002
2. The project management life cycle, Jason Westland, First published in Great Britain and the United States in 2006 by Kogan Page Limited
3. Understanding Results Based Programme Planning and Management

Reference Book:

Strategic issues and challenges in health management, KV Ramani, Dileep Mavalankar, Dipti Govil, 2005

PH18302 – Public Health Informatics

Course No	Name of the Course	L	T	P	C
PH18302	Public Health Informatics	3	1	1	4

Unit 1: Introduction to Public Health Informatics

Concepts of Informatics, Differentiation of Data vs. Information, Components of an Information System

Unit 2: Surveillance data handling

Electronic Health Records, Data Sources and Data Tools, Management of Databases, Privacy, Security, and Ethics.

Unit 3: Public Health Informatics systems Development

Management Systems, IT Solutions, Decision Support Systems Development, Systems development, Design Implementation.

Unit 4: Evaluation for Public Health Informatics

Standards and Benchmarks in Public Health Informatics, Types of Evaluations in informatics, protocol development for evaluation, Outcome assessment

Unit 5: Information Technology Systems Topics

Artificial Intelligence and Expert Systems, Public Health Surveillance Systems

Text Books:

1. Public Health Informatics and Information Systems Magnuson, J.A., Fu, Jr., Paul C. (Eds.) 2nd ed. 2014, XVIII, 666 p. 114 illus., 35 illus. in color.
2. Fried, A. and O'Carroll, P.W. (1998) "Public Health Informatics." In Last, J.M.(ed) Maxcey-Rosenau- Last Public Health & Preventive Medicine, 14th ed. Pp. 59-65. Appleton and Lange, Norwalk, CT.
3. Stair, R.M., & Reynolds, G.W. (2001). Principles of Information Systems 7th Edition Cambridge, MA: Course Technologies.

PH18303- Quality Assurance and Total Quality Management

Course No	Name of the Course	L	T	P	C
PH18303	Quality Assurance and Total Quality Management	3	2	0	4

Unit 1: Quality

Definition, Garvin's approaches to defining quality, Importance of quality, Types of quality, Levels of quality, Characteristics of Quality, Perspectives of quality, and History. Public Health Quality- Definition, Vision and Mission, Key Principles, Aims, Dimensions and Cost; Quality Indicators-Definition, Process of Development and Approaches; Quality Assessment-Purpose and Tools- Denabedian Model, APEX/PH and PATCH. Case Studies

Unit 2: Quality Improvement

Public Health Quality Improvement- Definition, Principles, Strategies and Priority Areas. Public Health Quality Improvement Methods- Plan-Do-Check-Act method, Juran Trilogy, The Baldrige Method, The Turning Point Method and Modular Kaizen method. Public Health Quality Improvement Tools- Check Sheets, Flowcharts, Graphs, Histograms, Pareto Charts, Scatter Diagram, Cause-and-Effect Diagrams and Affinity Diagram. Case studies

Unit 3: Quality Assurance

Public Health Quality Assurance- Definition, Principles, Components; Quality Monitoring Cycle, Building Quality Assurance Program, Quality Assurance Projects-PRICOR and CCCD. Approaches: Plan-Do-Check-Act Model, Quality Control, Benchmarking, Best Practice, Accreditation (individual level, Organization level and Service-Specific), Auditing, Regulation, Risk Management, Modular Kaizen method. Quality Management Systems-ISO Standards and Indian Public Health Standards. Case Studies

Unit 4: Total Quality Management

Introduction, Evolution of Quality Management, Principles, Key Elements, Core Concepts, Benefits, Prerequisites and Steps in implementing Total Quality Management. Case Studies.

Unit 5: Six Sigma

Introduction, Main Concepts, Basic Assumptions, Special Features and Benefits. Six Sigma methods-DMAIC and DMADU, Six Sigma Organizational Architecture. Case Studies.

Text books:

1. The management and control of quality -James R Evans & William M Lindsay, 8th edition-South-Western Cengage learning, 2011
2. Managing Quality in Healthcare.-P.R.Sodani -Rawat Publications 2010

Reference books:

1. Improving outcomes in public health practice: strategy and methods, By G. E. Alan Dever, 2010
2. Total Quality Management: The Health Care Pioneers Mara Minerva Melum and Marie Kuchuris Sinioris, 2010
3. Continuous Quality Improvement in Healthcare Curtis P. McLaughlin and Arnold D. Kaluzny, 2006
4. The Public Health Quality Improvement Handbook by Ron Bialek et. al.,2011
5. Developing Health Management Information Systems, A Practical World Health Organization, 2012

PH18304 – Public Health Emergency Preparedness and Management

Course No	Name of the Course	L	T	P	C
PH18304	Public Health Emergency Preparedness and Management	3	1	1	4

Unit 1: Introduction to Disaster

Disaster concepts, Complex emergencies, risk, hazard and vulnerability, Public health consequences of disaster, Psychosocial and economic impact of disaster.

Unit 2: Public Health approaches to Disaster

Disaster epidemiology, phases of disaster, outbreaks, Early warning system, preparedness, Surveillance

Unit 3: Human Health Impact of Disaster

Droughts, Epidemics, Other natural disasters, mental health, Essential health services,

Unit 4: Responding to Health Needs

Needs assessment-health, nutrition and WASH. SPHERE standards, IDPs, Refugees, Life course approach, Cluster approach, Supply Chain Management during Disaster

Unit 5: Public Health Emergency Preparedness

Preparedness at household, community and global level. Disaster risk management for health, all hazards approach

Text Books:

1. Disaster Management Guidelines. GOI-UNDP Disaster Risk Reduction Programme (2009-2012).
2. Disaster Medical Systems Guidelines. Emergency Medical Services Authority, State of California, EMSA no.214, June 2003
3. Guerisse P. 2005 Basic Principles of Disaster Medical Management. Act Anaesth. Belg;56:395-401

Reference Books:

1. Aim and Scope of Disaster Management. Study Guide prepared by Sharman and Hansen. UW-DMC, University of Washington.
2. Sphere Project (2011). Humanitarian Charter and Minimum Standards in Disaster Response.
3. Geneva: Sphere Project. <http://www.sphereproject.org/handbook/>

PH18305 - Public Health Planning, Monitoring, Evaluation and Governance

Course No	Name of the Course	L	T	P	C
PH18305	Public Health Planning, Monitoring, Evaluation and Governance	5	1	1	6

Unit 1: Public Health Planning

Introduction to PH planning, PH planning models, PH planning frameworks and tools (CDC), Best practice in PH.

Unit 2: Public Health administration

Functions of public health, principles of public health administration, essential public health services, system perspective in PH, role of public health administrator, legal framework of health in India

Unit 3: Monitoring in PH

Program monitoring, Supportive Supervision, Developing monitoring indicators, RBMS

Unit 4: Evaluation in PH

Evaluation models, theories and methods, CDC framework on program evaluation in public health, Economic evaluation, Scope of Work for Evaluation

Unit 5: Public Health Governance

Health governance, Three key governance dynamics, Functions of PH governance, global PH governance, challenges in PH governance

Text Books

1. Challenges in Monitoring and evaluation, An opportunity to institutionalize M & E systems- Gladys Lopez, Katia Rivera, Lincy Lima, Helean Hwang- World Bank, 2010
2. Governance for health in the 21st century, WHO

Reference Books

1. Handbook on Monitoring and evaluation, UNDP, 2010
2. Results Based Monitoring, UNDP, 2007
3. A guide to Monitoring and Evaluation, 2010

PH18306 - Logistics and Supply Chain Management

Course No	Name of the Course	L	T	P	C
PH18306	Logistics and Supply chain Management	3	1	1	4

Unit 1: Introduction to Logistics Management

Logistics- Key Logistics Terms and Definitions , Logistic in health program, Commodity Security, Basics of supply chain management, 7 “C’s” of Commodity Security, Six Rights Ensure Customer Service, Selecting Products, Factors to Consider When Selecting a Product, Steps in Quantifying Commodity Requirements, Forecasting Commodities

Unit 2: Standard Supply Chain Functions

Network design, Demand forecasting, Supply demand planning, Product procurement, Transportation procurement , Transportation planning, Transportation management , Trade compliance , Warehouse management , Inventory management, Order management , Customer management, Building a Supply Plan- Financing Your Forecast, Procurement, Phases of Procurement, Inventory Management, Inventory Control Systems, Quality Assurance, Components of a Distribution System, Rationing

Unit 3: Supply Chain Management in PH

Johns Snow Inc Framework (JSI) for integrated supply chain management, Principles and practices in supply chain management, characteristics of integrated supply chain management, sequential phases of integration- ad hoc phase, organized phase, integrated phase, institutionalizing supply chain management. Supply chain integration framework, Impact of Logistics on Health Programs, Strategic Pathway to Reproductive Health Commodity Security Framework

Unit 4: Logistics Management Information System

Integrated and Vertical Logistics Systems, Integrated Supply Chain Management for Public Health, Monitoring Stock Status and Procurement Plans, Role of Leaders and Policymakers in Logistics

Unit 5: Logistics and Disaster

Introduction to humanitarian logistics, Humanitarian logistics components, procurement, distribution, assessment, Humanitarian supply chain, Humanitarian Supply Management and Logistics in the Health Sector

Text books:

1. Supply Chain Management: Strategy, Planning, and Operation-Sunil Chopra and Peter Meindel. Prentice Hall of India, 2002

Reference books:

1. Quantitative Models for Supply Chain Management. Sridhar Tayur, Ram Ganeshan, Michael Magazine (editors), 2003
2. Introduction to Supply Chain Management R.B. Handfield and E.L. Nochols, 2006

PH18301 – Results Based Project Management

Course No	Name of the Course	L	T	P	C
PH18301	Results Based Project Management	3	1	1	4

Unit 1: Introduction to Basic Concept of Project Management

Project life cycle, project management process, needs assessment, stakeholder identification, resource mapping, introduction to RBM

Unit 2: Problem analysis, objective analysis and strategy analysis

Problem tree, objective tree, SWOT analysis, Stakeholder analysis, Scoping,

Unit 3: Logical Framework Approach and Tools

Introduction to Log Frame Approach and its Tools, Logical Framework Matrix and conceptual clarity of the format, Hierarchy of objectives and result chain, Means of verification, Assumptions and risks, Theory of Change

Unit4: Performance Measurement Framework

Introduction to Performance Measurement Framework, Develop PMF at each result level, activity scheduling,

Unit 5: Results Based Reporting System

Developing reporting format to monitor the results at all levels. Developing reports and dissemination of reports to different audiences.

Text Books:

1. Handbook on Project Cycle management, European commission, version 2.0, 2002
2. The project management life cycle, Jason Westland, First published in Great Britain and the United States in 2006 by Kogan Page Limited
3. Understanding Results Based Programme Planning and Management

Reference Book:

Strategic issues and challenges in health management, KV Ramani, Dileep Mavalankar, Dipti Govil, 2005

PH18303 – Public Health Informatics

Course No	Name of the Course	L	T	P	C
PH18303	Public Health Informatics	1	1	1	2

Unit 1: Introduction to Public Health Informatics

Concepts of Informatics, Differentiation of Data vs. Information, Components of an Information System

Unit 2: Surveillance data handling

Electronic Health Records, Data Sources and Data Tools, Management of Databases, Privacy, Security, and Ethics.

Unit 3: Public Health Informatics systems Development

Management Systems, IT Solutions, Decision Support Systems Development, Systems development, Design Implementation.

Unit 4: Evaluation for Public Health Informatics

Standards and Benchmarks in Public Health Informatics, Types of Evaluations in informatics, protocol development for evaluation, Outcome assessment

Unit 5: Information Technology Systems Topics

Artificial Intelligence and Expert Systems, Public Health Surveillance Systems

Text Books:

4. Public Health Informatics and Information Systems Magnuson, J.A., Fu, Jr., Paul C. (Eds.) 2nd ed. 2014, XVIII, 666 p. 114 illus., 35 illus. in color.
5. Fried, A. and O'Carroll, P.W. (1998) "Public Health Informatics." In Last, J.M.(ed) Maxcey-Rosenau- Last Public Health & Preventive Medicine, 14th ed. Pp. 59-65. Appleton and Lange, Norwalk, CT.
6. Stair, R.M., & Reynolds, G.W. (2001). Principles of Information Systems 7th Edition Cambridge, MA: Course Technologies.

Specialization IV - Biostatistics

PH18331 – Regression Analysis

Course No	Name of the Course	L	T	P	C
PH18331	Regression Analysis	3	1	1	4

Unit 1: Simple Linear Regression Model

Description of Data Model – Estimation and Test of Hypotheses – Index of Fit – Predicted Values and Standard Errors – Evaluation of Fit – Analysis of Residuals.

Unit 2: Multiple Regression Model

Description of Data and Model; Interpretation of Coefficients; Properties of Least Square Estimators; Test of Hypothesis on the Linear Model; Qualitative Predictor Variables and their uses.

Unit 3: Regression Diagnostics

Effect of Outliers in Simple Regression – Model Adequacy and Residual Plots – Deletion of Data Points – Transformations of Variables – Transformation to Achieve Linearity, Transformation to Stabilize Variance. – Removal of Heteroscedasticity – Principle of Weighted Least Squares.

Unit 4: Autocorrelation and Multicollinearity

Autocorrelation- Problem of Correlated Errors, Durbin-Watson Statistics- Detection and Correction of Auto correlation Forecasting-Autoregressive integrated moving average (ARIMA) model Multicollinearity- Its Effects on Inference and Forecasting – Detection and Correction of Multicollinearity

Unit 5: Variable Selection Procedures

Introduction, Formulation of Problem and Consequences of Variable Deletion; Procedures– Forward Selection Procedure – Backward Elimination Procedure – Stepwise Method.

Text Book:

1. Regression Analysis by Example by S. Chatterjee and Ali S. Hadi ,John Wiley & Sons, New York, Fourth Edition, 2006. (e-book)

Reference Books:

1. Applied Regression Analysis by Norman R. Draper & Harry Smith, Wiley-Blackwell, Third Edition, 1998.
2. Regression Methods in Biostatistics; Linear, Logistic, Survival, Repeated measures Models by Vittinghoff.E, Glidden, D.V., Shiboski. S.C., and McCulloch C.E. Springer, Second Edition, 2012.(e-book).

PH18332 - Categorical Data and Survival Analyses

Course No	Name of the Course	L	T	P	C
PH18332	Categorical Data and Survival Analyses	4	1	1	6

Unit 1: Introduction to Categorical Data Analysis

Response Variable and Explanatory Variables, Variable Measurements, Sampling Framework, Review of Discrete Distributions, Inference for a Single Population Proportion

Two-Way Contingency Tables - Basic Sampling Distributions, Key Attributes of Sampling Designs, Popular Measures of Association, Invariance Properties, Inference: Tests for Independence

Three-Way Contingency Tables - Three Way Contingency Tables, Simpson's Paradox, Marginal vs. Conditional Independence, Homogeneous Association, Cochran-Mantel-Haenszel Methods

Unit 2: Loglinear Models for Contingency Tables

Basic Uses, Loglinear Models for Two-Way Tables, Loglinear Models for Three-Way Tables, Loglinear and Logit Connections, Independence Graphs and Collapsibility, Ordinal Association

Unit 3: Logistic Regression

Setup, Logit Transformation, Interpretation of the Logistic Curve, Inference for Logistic Regression, Logit Models with Qualitative Predictors, Multiple Logistic Regression, Building and Applying Logistic Regression Models, Logistic Regression and Discriminant Analysis

Unit 4: Multicategory Logit Models (Polychotomous)

Logit Models for Nominal Responses, Cumulative Logit Models for Ordinal Responses, Paired-Category Ordinal Logits

Unit 5: Introduction to Survival Analysis

Definition of Survival Time, Hazard Rate, Censoring, Truncation and Types of Censoring. Estimation of Survival Time by Life Table and Kaplan-Meier Methods. Comparison of Survival Time between subgroups using Log-Rank Test, and Modeling for Survival using Poisson Regression and the Cox Proportional Hazards Models. Evaluating the proportional hazards assumption.

Text Books:

1. Categorical Data Analysis, Alan Agresti, A. NY: Wiley, Second Edition, 2007
2. Survival Analysis Techniques for Censored and Truncated Data, Klein, J. P. and Moeschberger M., Springer-Verlag, Second Edition, 2003.
3. Survival Analysis- A self Learning Text, David G. Kleinbaum and Mitchel Klein, Springer, Second Edition, 2008

Reference Books:

1. Introduction to the Statistical Analysis of Categorical Data, Andersen, E.B., Springer- Verlag, 1997
2. Analyzing Categorical Data, Jeffrey S.Simonoff, Springer, 2003.
3. Modeling Survival Data in Medical Research, Collett, D. Chapman & Hall, Second Edition, 2003.
4. Analysis of Survival Data, Cox, D.R. and Oakes, D., Chapman & Hall, 1984.

PH18333 - Applied Multivariate Analysis

Course No	Name of the Course	L	T	P	C
PH18333	Applied Multivariate Analysis	4	1	1	6

Unit 1: Introduction to Multivariate Data

Introduction-Multivariate Problem, Methodologies of Data Cleaning and Normality Test, and Graphical Representations of Multivariate Data

Unit 2: Tests on Mean Vector

MANOVA-(One-way and Two-way), Repeated measures as a multivariate problem

Unit 3: Exploratory Analysis

Principal components analysis, Factor analysis, Correspondence analysis, Correlation Analysis and Multidimensional Scaling.

Unit 4: Classification and Clustering

Distance and Similarity, Two-Step, K-Means, Hierarchical Clustering Techniques and Classification and Regression Tree Technique, Nearest Neighbor Analysis and Discriminant Analysis

Unit 5: Advance Techniques

Path analysis, Structural Equation Modeling and Multilevel Analysis

Text Books:

1. Applied Multivariate Statistical Analysis by Johnson, RA. and Wichern D.W., Pearson Prentice Hall, New York, 6th Edition, 2007
2. SPSS 17.0 for Researchers by Gupta S.L. and Hitesh Gupta, International Book House Ltd., New Delhi, Second Edition, 2013

Reference Books:

1. Multivariate Data Analysis by Joseph F. Hair, William C. Black, Barry J. Babin and Rolph E. Anderson, Prentice Hall Publications, Seventh edition, 2010.
2. Multivariate Data Reduction and Discrimination with SAS Software by Khattree, R., Naik, D.N., SAS Institute Inc, Cary NC, 2000.

PH18334 - Non-Parametric Methods

Course No	Name of the Course	L	T	P	C
PH18334	Non-Parametric Methods	1	1	1	2

Unit 1: Contingency Tables

The 2 x 2 Contingency Table, Chi-square Test for Differences in Probability, Fisher's Exact Test, The Chi-square Test for Independence, The Chi-square Test with Fixed Marginal Totals.

Unit 2: Median Test

An Extension of Median Test, and Measures of Dependence: Cramer's Contingency Coefficient, Pearson's Contingency Coefficient, The Phi-coefficient. Cochran's Test for Related Observations: The Cochran's Test.

Unit 3: Methods Based on Ranks (Through Independent Samples)

The Mann-Whitney test, Several Independent Samples: The Kruskal – Walli's Test.

Unit 4: Measures of Rank Correlation

Spearman's Rho, Kendall's Tau, The Daniel's Test for Trend – The Jonckere – Terpstra Test – Kendall's Partial Correlation Coefficient.

Unit 5: Several Related Samples

The Friedman Test, The Quade Test, The Page Test for Ordered Alternatives, The Kolmogorov Goodness-of-fit Test.

Text Books:

- 1) Practical Nonparametric Statistics, W.J. Conover,, John Wiley & Sons, New York , Third Edition, 2006.
- 2) Non Parametric Statistics for Health care research, Majorie A. Pett, Sage, 1997.

PH18335- Systematic Reviews and Meta Analysis

Course No	Name of the Course	L	T	P	C
PH18335	Systematic Reviews and Meta Analysis	1	0	2	2

Unit 1: Introduction to Systematic Review

Evidence based health care, role of systematic reviews in evidence based health care practice - Introduction to Systematic Reviews, Rationale, Potential and promise of systematic reviews, Principles and procedures of Systematic reviews, Advantages , Problems and limitations in conducting Systematic reviews – Types of systematic reviews – systematic review of observational studies, clinical trials and diagnostic studies – differences between narrative and systematic reviews

Unit 2: Planning Process and synthesis of Systematic reviews

Planning a review, Protocol writing, searching for studies – search strategy, locating and selecting studies, assessing the quality of studies, assessing the risk of bias in included studies – Introduction to Review Manager (Rev Man) software for systematic reviews

Unit 3: Introduction and process of Meta analysis

Introduction to Meta analysis, stages in Meta analysis, Minimising error and bias, Criticisms of Meta analysis, advantages and limitations in Meta analysis

Unit IV: Application of Meta analysis in systematic reviews –I

Systematic review and meta analysis , statistical methods for combining results from several studies – weighted average, effect size based on means, effect size based on correlations, effect based on binary data, Forest Plot

Unit V: Application of Meta Analysis in Systematic Reviews – II

Model: Fixed effect model and random effect model, Diversity and Heterogeneity, Sensitivity analyses. Publication bias – meaning, detecting and managing publication bias – Funnel Plot. Critical review of systematic reviews

Text Books:

- 1) Cochrane Handbook for Systematic Reviews of Interventions, Julian PT Higgins and Sally Green, Oxford: Cochrane collaboration, 2011.

Reference Books:

- 1) Practical meta-analysis, Mark W. Lipsey, David B. Wilson, Sage Publications, 2001.
- 2) The Handbook of Research Synthesis Harris Cooper , and Larry V. Hedges , Russel sage, 1994.
- 3) Systematic Reviews and Meta-Analysis- Pocket guide to social work research methods, Julia H. Littell, Jacqueline Corcoran, Vijayan Pillai, Oxford Univ Press, 2008.

PH18336 -Spatial Statistics

Course No	Name of the Course	L	T	P	C
PH18336	Spatial Statistics	2	0	2	3

Unit 1: Spatial Data

Need for Spatial Data, Types of Spatial Data, Components of Spatial Data, Source of Spatial Data; Geographical Information System- Vector and Raster GISs, Basics of GIS operations, Spatial Analysis with GIS; Problems with Spatial Data and GIS- Inaccurate and Incomplete Databases, Confidentiality, Use of ZIP Codes, Geocoding Issues and Location uncertainty.

Unit 2: Visualization of Spatial Data

Cartography, Types of Statistical Maps- Maps for Point and Areal Features; Symbolization- Maps, Generalization, Visual Variables, Color; Mapping Smoothed Rates and Probabilities- Locally Weighted Averages, Non-parametric Regression, Empirical bayes Smoothing Probability Mapping; Exploratory Data Analysis- Univariate and Multivariate.

Unit 3: Spatial Auto

Correlation Analysis-Aims, Assumptions and Typical Output, Methods- Moran'I and Geary's C; Local Indicators of Spatial Associations- Aims, Assumptions and Typical Output, Methods-Pearson's Chi-Square, Tango Index and Focused Score Tests to Trends.

Unit 4 Spatial Regression Analysis

Fitting of Regression Models for Independent and Spatially Auto Correlated Data, Estimation and Inference, Interpretation and Use with Spatial Data. Predicting New Observations- Universal Kriging.Fitting of Simultaneous and Conditional Autoregressive Models, Concluding Remarks on Conditional and Spatial Autoregressive models.

Unit 5: Project Work

Students are expected to use some of techniques studies here to map Epidemiological Data.

Text Books:

1. Applied Spatial Statistics for Public Health Data by Walter LA and Gotway CA, Wiley Series, 2004.
2. Applied Sptial Data Analysis with R by Roger S. Bivand, Edzer J Pebesma and Gomez-Rubio V, Spriner Series, Second Edition, 2013.
3. GeoDa 0.9 User's Guide by Luc Anselin, Center for Spatially Integrated Social Science, 2003.

Reference Books:

1. Interactice Spatial Data Analysis by Trevor Bailey and Tony Gatrell, Prentice Hall, Second Edition, 2009.
2. Epi Info Mapping Open source Software Manual, 2003
3. Helalth Mapper, WHO manual, 2006

PH18337- Data Analysis using SAS

Course No	Name of the Course	L	T	P	C
PH18337	Data Analytics using SAS	1	1	3	3

Unit 1: Introduction to SAS

SAS Data, formatting, Listing, data set creation, Manipulation of SAS data, Exporting Data, Processes and Output in SAS, Data Management in SAS, Reporting and Analysis, SAS interpretation of data, Managing flow process, running and re running tasks and activities, properties of data tables, Selected in formats and standard formats, writing and running custom SAS code

Unit 2: Data Access and Data Importing

Formatted and list input to process raw data, in file statement use for processing raw data, process raw data files including column and pointer controls, Merging of SAS data sets, access excel sheets and workbooks

Unit 3: Data Management in SAS

SAS libraries, Sources of data, editing values, creating sorting data tables, delimited raw data, formatted data, importing and exporting data, sorting observations, executing SAS statements, modify variable attributes, SAS function manipulation for character data, numeric data, and SAS date values, Processing via Do loops, SAS arrays and Validation and cleaning of data

Unit 4: Processing and Analysis

Application of standard formats in a data grid, task, definition of own character formats, own numeric formats, application of user defined formats, querying Columns, sorting data in a query, Utilization of Mathematical Operators in expression editor, selected functions, adding grand totals, subtotals, creating summary data, filtering of data, creating compound filters, filtering with grouped data, recoding values. Appending tables, joining tables.

Unit 5: Reporting and Inference

Creating simple lists of Data, frequency reporting, cross tabulations, simple summary reports, summary data sets in task, Summary tables, changing heading properties, Distribution analysis, summary statistics, table analysis, correlations, linear regression, ANOVA, changing output format, output style, creating parameters for Data Values, filter condition, generate reports using ODS statements, Recognize and correct syntax errors.

Text Book:

1. The Little SAS Book for Enterprises Guide 4.1, Susan J Slaughter Lara D Delviche SAS, 2006 Institute INC, NC, VSA, ISBN-978-1-59994-089-2, 2012

Reference Book:

1. Health Care Data and SAS Marge Scerbo, Craig Dickstein, and Alan Wilson, 1stedition SAS Institute, 2000