GRADUATE RESEARCH PROGRAMMES (MSc and PhD)
AY2017/2018 MODULE DESCRIPTION

CORE MODULES

SPH5002 Public Health Research Methods (for both MSc and PhD)
Modular Credits: 8
Pre-requisites: Nil
Preclusions: CO5102 Principles of Epidemiology and CO5103 Quantitative Epidemiologic Methods

This module provides students with the foundational knowledge of epidemiology and biostatistics, and introduces students to the key principles of qualitative research methods. Students will learn how to quantify the burden of disease in populations, identify potential risk factors, develop and test hypotheses. Key considerations for the design of observational, interventional, and screening studies, and basic skills related to the analyses and interpretation of data from such studies will be emphasised. Students will gain an appreciation of the complementary nature of qualitative and quantitative research methodologies in answering public health questions.

SPH5203 Advanced Epidemiology I (for MSc)
Modular Credits: 4
Pre-requisites: SPH5002 Public Health Research Methods; OR CO5102 Principles of Epidemiology and CO5103 Quantitative Epidemiologic Methods
Preclusions: CO5215 Advanced Epidemiology I

This module covers advanced methods for the design, conduct, analysis and interpretation of epidemiologic studies. The main focus is on analytical studies that aim to identify risk factors for diseases particularly case-control and cohort studies. Topics include causal inference, study design, methods of handling confounding and identifying effect modification, measurement error and information bias, selection bias, lifestyle and molecular epidemiology, and meta-analysis.

SPH5101 Advanced Quantitative Methods I (for MSc)
Modular Credits: 4
Pre-requisites: 1) A minimum grade ‘B-‘ obtained in CO5103 Quantitative Epidemiologic Methods OR SPH5002 Public Health Research Methods, and 2) and working knowledge of STATA.
Preclusions: CO5218 Advanced Quantitative Methods I

In this module, the principles of statistical modelling will be introduced, and statistical models such as multiple linear regression, logistic regression and Cox proportional hazards model will be applied to a variety of practical medical problems. Methods for analysing repeated
measures data, assessment of model fit, statistical handling of confounding and statistical evaluation of effect modification will also be discussed.

**SPH6001 Advanced Epidemiology II (for PhD)**

Modular Credits: 4  
Pre-requisites: CO5102 Principles of Epidemiology/ Basic Epidemiology  
CO5103 Quantitative Epidemiologic Methods /Basic Biostatistics  
Preclusions: Nil

This module covers advanced methods for the design, conduct, analysis and interpretation of epidemiologic studies. Students will apply these methods to the interpretation of published research and the design of a new research project. The main focus is on analytical studies that aim to identify risk factors for diseases particularly case-control and cohort studies. Topics include causal inference, study design, methods of handling confounding and identifying effect modification, measurement error and information bias, selection bias, lifestyle and molecular epidemiology, and meta-analysis. Students will be expected to critique research articles and participate in facilitated group discussions.

**SPH6002 Advanced Quantitative Methods II (for PhD)**

Modular Credits: 4  
Pre-requisites: A minimum grade of ‘B-’ obtained in CO5103 Quantitative Epidemiologic Methods and working knowledge of STATA  
Preclusions: Nil

In this module, the principles of advanced statistical modelling will be introduced, and statistical models such as multiple linear regression, logistic regression and Cox proportional hazards model will be applied to a variety of practical medical or public health problems. For time-to-event data analysis involving the Cox proportional hazards model, the proportional hazards assumption will be discussed, and strategies for handling non-proportional hazards, such as via stratification or modelling using time-dependent covariates will be introduced. We also consider the situation where several competing event types define the event of interest in a time-to-event study. Methods for analysing repeated measures data, assessment of model fit, statistical handling of confounding and statistical evaluation of effect modification will also be discussed. The statistical models introduced will be applied to real life clinical or public health data.
ELECTIVE MODULES

SPH5003 Health Behaviour and Communication
Modular Credits: 4
Pre-requisites: Nil
Preclusions: CO5203 Lifestyle and Behavior in Health and Disease

This module applies concepts and methods in social and behavioural sciences to evaluate and inform development of health promotion policies, programmes and services. It provides students with the principles and skills to address the social, psychological and environmental factors influencing behaviour and behaviour change. Upon completion of this module, students will be able to apply commonly used behavioural theories and models to change and evaluate behaviour at the individual, group and community level for the development of effective public health promotion interventions.

SPH5004 Introduction to Health Policy and Policy Analysis
Modular Credits: 4
Pre-requisites: Nil
Preclusions: CO5104 Health Policy & Systems

The module provides students with an overview of health systems and the origin, development, and the various components that make up an effective health policy. Theoretical frameworks and concepts will be introduced to help students understand and analyse health policies and the challenges faced by stakeholders in the health system. Through a mix of lectures, in-class group discussion, and group work with case studies, students will describe, analyse and develop health policy solutions for common public health problems faced by Singapore and regional countries.

SPH5102 Design, Conduct and Analysis of Clinical Trials
Modular Credits: 4
Pre-requisites: SPH5002 Public Health Research Methods; OR CO5102 Principles of Epidemiology and CO5103 Quantitative Epidemiologic Methods
Preclusions: CO5220 Design, Conduct and Analysis of Clinical Trials

In this module, issues in clinical trials, including blinding randomisation, sample size, power, ethical, regulatory, and quality-of-life issues will be addressed. Interim and sequential analyses, analysis of multiple treatments and endpoints, stratification and subgroup analyses, as well as meta-analysis of randomised controlled trials will also be discussed. Although particular emphasis is given to the evaluation of treatment in Phase III clinical trials, early phase trials studies will also be covered.

SPH5103 Collection, Management & Analysis of Quantitative Data
Modular Credits: 4
Pre-requisites: Nil
Preclusions: CO5232 Collection, Management & Analysis of Quantitative Data
This module is an introduction to collection, management and data analysis of quantitative surveys in public health research, with strong emphasis on acquiring hands-on experience for handling public health data with the STATA software. It will cover essential concepts such as sampling and design of questionnaires as well as practical components such as data storage, management, and basic statistical analysis of questionnaire data.

**SPH5104 Healthcare Analytics**  
Modular Credits: 4  
Pre-requisites: SPH5002 Public Health Research Methods; OR CO5103 Quantitative Epidemiologic Methods  
Preclusions: CO5237 Healthcare Analytics

This module will cover major topics in healthcare analytics, including clinical related analytics (diseases, medication, laboratory test, etc.) and healthcare operations related analytics (resource planning/scheduling, care process analytics and improvement, admission and readmission, etc.). Students will learn the insights of these different healthcare analytics areas, and how to select the right analytics techniques for these healthcare analytics problems.

**SPH5201 Control of Communicable Diseases**  
Modular Credits: 4  
Pre-requisites: Nil  
Preclusions: CO5201 Control of Communicable Diseases

This module focuses on infectious diseases of public health concern in Singapore and internationally. The course will cover concepts in the prevention, surveillance and control of infectious diseases, with a focus on vector-borne diseases (in particular dengue and malaria), foodborne diseases, HIV/AIDS and sexually transmitted diseases, tuberculosis, acute respiratory illnesses, and nosocomial infections. In addition, students will be exposed to concepts in the evaluation of vaccines and vaccination programmes, and will obtain hands-on experience in outbreak investigation through a simulated outbreak exercise. Students will learn to critically appraise and discuss the application of current control strategies. This module is highly relevant for students who intend to work in infectious disease control in local and international governmental and non-governmental organisations, or who wish to pursue academic research on infectious diseases from a public health perspective.

**SPH5202 Control of Non-Communicable Diseases**  
Modular Credits: 4  
Pre-requisites: Principles of epidemiology module  
Preclusions: CO5201 Control of Non-Communicable Diseases

In this module, the public health approach to non-communicable disease control will be illustrated with integration of epidemiological parameters (i.e. risk factors, prevention, surveillance) and the WHO guidelines of Control of NCDs including life course and common
lifestyle approach and evidence based practice. Students will read, critically appraise and discuss the application of some relevant epidemiological studies. Finally, they will perform a literature search to identify relevant community programmes to enhance current control of NCDs in Singapore.

SPH5204 Nutrition and Health - Fundamentals and Applications
Modular Credits: 4
Pre-requisites: Nil
Preclusions: CO5229 Nutrition and Health

This module introduces the concepts and principles underlying nutrition in relation to health and diseases, so as to better understand and address population nutrition challenges. Content areas include an overview of nutrition as a major determinant of health and disease; methods to assess nutritional status; maternal and child health through the lens of a life course perspective; nutrition during ageing and evaluation of effective nutritional interventions. This class will include discussion of nutrition policies and strategies, multi-sectoral approaches and the importance of public-partnerships aimed at preventing chronic diseases.

There will be a strong emphasis on gaining practical skills in dietary assessments, critical appraisal of scientific literature and media articles relating to diet and nutrition and communication of nutritional science to the public. The teaching approach involves class interaction and provides opportunities for self-reflection.

SPH5401 Health Economics and Financing
Modular Credits: 4
Pre-requisites: Nil
Preclusions: CO5204 Health Economics and Financing

This module addresses the economic and financing aspects of the production, distribution, and organisation of health care services and delivery. This includes the structure of health care delivery and insurance markets, demand for and supply of health services, pricing of services, cost of care, financing mechanisms, and their impact on the relevant markets. A special emphasis will be given to market failures and the role of government in the market for health services. Through textbook readings and discussions of seminal articles and more recent empirical applications in health economics, students will learn the economic way of thinking. They will be given the opportunity to showcase these skills through a series of research papers written throughout the semester that will culminate with a final manuscript that provides an in-depth analysis of a critical health issue.

SPH5403 Medical & Humanitarian Emergencies
Modular Credits: 4
Pre-requisites: Nil
Preclusions: CO5206 Medical & Humanitarian Emergencies

This module provides a practical introduction to disaster management.
Medical and humanitarian emergencies are complex challenges requiring urgent, thoughtful and coordinated action. Participants will be equipped with the basic knowledge and skills to plan and manage humanitarian assistance to disaster-affected populations, in accordance with internationally recognised guidelines in life-saving areas of humanitarian response. The course is designed for individuals involved in disaster response, mitigation or preparedness, in a professional or voluntary capacity, within the regional or international humanitarian and development sectors.

**SPH5404 Measuring and Managing Quality of Care**
Modular Credits: 4  
Pre-requisites: Nil  
Preclusions: CO5208 Measuring and Managing Quality of Care

This module provides an introduction to the concepts and techniques used to measure and improve the quality of healthcare. It will address current concerns with patient safety and medical errors, and explore systemic approaches to harm reduction. Participants will understand the methodologies and instruments for the measurement of quality in healthcare, including clinical outcome indicators, healthcare professionals’ performance measurement and patient satisfaction surveys. Strategies for managing quality, including the tools for continuous quality improvement in healthcare organisations, will be presented.

**SPH5405 Introduction to Health Services Research**
Modular Credits: 4  
Pre-requisites: SPH5002 Public Health Research Methods; OR CO5102 Principles of Epidemiology and CO5103 Quantitative Epidemiologic Methods  
Preclusions: CO5214 Introduction to Health Services Research

This module is an introduction to the various domains of and methods for health services research. It is designed to provide students with a panorama of health services research and its applications and the information for further learning. The module integrates elements of statistics, psychometrics, health economics, and incorporates a diverse range of subjects including patient-reported outcomes, decision analytic modelling, and cost-effectiveness analysis.

**SPH5406 Contemporary Global Health Issues**
Modular Credits: 4  
Pre-requisites: Nil  
Preclusions: CO5221 Contemporary Global Health Issues

This module offers students a panoramic overview of the evolving global health landscape in today’s globalised society which is characterised by unprecedented interconnectedness. Public health problems and consequences are now easily trans-national, if not global. We will focus on key cross-cutting thematic areas linking Health with the Sustainable Development Goals (SDGs).
SPH5407 Programme Evaluation
Modular Credits: 4
Pre-requisites: Nil
Preclusions: CO5222 Programme Evaluation

This course is an introductory graduate level course to programme evaluation, broadly covering formative, process, and impact evaluation. Formative evaluation includes needs assessment, a tool typically used for programme planning, which is an inter-related activity to evaluation. As part of this course, students will be developing evaluation strategies for an actual public health programme. This is an opportunity to practice evaluation theory, design, and planning within real world constraints.

SPH5408 Public Health and Ageing
Modular Credits: 4
Pre-requisites: Nil
Preclusions: CO5230 Public Health and Aging

In this module, an overview of the ageing population and its increasing relevance for public health planning and policy, both in Singapore and internationally. Major topics include demography of ageing, normal (physiological and biological) and abnormal (physical and mental) ageing, prevention of ageing-related diseases and compression of morbidity, health and social services and policies for older persons, and medico-legal and ethical issues of care for the older persons. Students will learn how to apply their knowledge to critically appraise health and social programmes and policies for older persons and apply medico-legal and ethical principles in the care for older persons.

SPH5409 Qualitative Methods in Public Health
Modular Credits: 4
Pre-requisites: Nil
Preclusions: CO5233 Qualitative Methods in Public Health

Qualitative methods in Public Health will familiarise students with the range of related data collection and analytic methods, as well as ethical considerations and ways to best communicate this approach.

Students will learn practical techniques to improve the quality of data collection, including: In depth interviews, focus groups and observational methods. We will also explore lesser-known approaches such as using photo voice or how to ‘walk through spaces’.

Emphasis will be given to data management and transparency in analyses, the best ways of doing these, using practical policy relevant methods.

SPH5410 Developing health proposals using DME skills & tools
Modular Credits: 4
Pre-requisites: Nil
Two of the most important skills that public health practitioners need to develop are programme design and proposal writing. These two skills are inseparably linked: they are two sides of the same coin. A poorly designed project or programme will have very little chance of successfully competing for funds, while an innovative, well-conceived project will never get funded unless it gets written into a good proposal. A good programme design in a good proposal can lead to better implementation and management, and sets the stage for good monitoring and evaluation. In turn, a project executed well has better chances for re-funding and expansion by donors.

This skills building design, monitoring and evaluation (DME) course is designed to introduce the potential proposal writer to the working environment that he will eventually confront repeatedly. It requires living through the process of applying good principles of programme/project design in developing a proposal.

Remarks:
It is recommended that students have completed CO5102 Principles of Epidemiology and CO5103 Quantitative Epidemiologic Methods or SPH5002 Public Health Research Methods prior to reading this module

SPH5411 Information Technology in Healthcare
Modular Credits: 4
Pre-requisites: Nil
Preclusions: CO5235 Information Technology in Healthcare

Students will learn about use of Information Technology in Singapore healthcare. They will gain knowledge and skills on managing IT projects in their workplace, learn about key considerations for IT project success, and be able to conduct a basic evaluation of healthcare IT products.

SPH5412 Economic Methods in Health Technology Assessment
Modular Credits: 4
Pre-requisite: Nil
Preclusions: CO5236 Economic Methods in Health Technology Assessment

This course aims to provide an applied introduction to Health Technology Assessment (HTA) research in order to enable students to begin conducting their own research and/or to understand research conducted by others. Health econometrics, cost-effectiveness and economic evaluation in healthcare, and conjoint analysis will be covered. Examples of economic analyses that have been used in all stages of HTA research, starting with quantifying economic burden of illness studies, to cost-effectiveness of particular health technologies, to budget impact and pricing will be included. Prior knowledge of basic statistics is recommended.
SPH5501 Public Health Communication
Modular Credits: 4
Pre-requisites: Students must pass the MPH core module CO5203 Lifestyle and Behaviour in Health and Disease or SPH5003 Health Behaviour and Communication
Preclusions: CO5226 Public Health Communication

This module focuses on the design, implementation, and evaluation of communication programmes designed to change or reinforce health behaviour. Emphasis will be on the step-by-step process of

1. formative research and analysis (including use of conceptual frameworks, audience research, and assessment of the media, policy and service environment),
2. theory-based and evidence-based strategic design,
3. message development, pretesting, and materials production,
4. implementation and monitoring, and
5. theory-based evaluation and dissemination of findings.

Upon completion of this module, students will be able to develop a work plan for a health communication project.

SPH6003 Nutritional Epidemiology
Modular Credits: 4
Pre-requisites: SPH5002 Public Health Research Methods; OR CO5102 Principles of Epidemiology and CO5103 Quantitative Epidemiologic Methods
Preclusions: Nil

Dietary exposures have an important impact on health, but are highly complex and difficult to assess. This module covers methods for the assessment of diet and nutritional status including novel developments such as the use of metabolomics and genetics. It also covers the design, conduct, analysis, and interpretation of epidemiological studies on diet and health. Students will be trained in the interpretation of published studies, the design of studies, and the analysis of data on diet and health. The emphasis of this course will be on the application of methods to provide skills that can be applied by students to their own research projects.

SPH6004 Advanced Biostatistics
Modular Credits: 4
Pre-requisites: Nil
Preclusions: Nil

This module will introduce several advanced topics for analyzing large or complex datasets, with a particular emphasis on biomedical and epidemiological data. Classical strategies for statistical inference, variable selection and model assessment are less efficient when the dimension of the dataset is large. This module will introduce Bayesian techniques and
multivariate data analysis in an applied framework that combines both computing and theory, and also overviews the problem of multiple testing correction common in, for example, genomics and proteomics studies.

Remarks: Students interested in this module should have background in Statistics.