# Pharmaeconomics and health technology assessment

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***COURSE AIMS AND INTENDED LEARNING OUTCOMES***

Pharmaeconomics and Health Technology Assessment (HTA) is a relevant field of studies in health economics, concerned with understanding whether resources are allocated to the most cost-effective treatment or health technology. The aim of this course is to present and discuss selected topics within this field, which are of utmost relevance for the management of healthcare organizations. During the course students will learn both theoretically and empirically how to assess a cost-effectiveness analysis to evaluate the adoption of a new medical treatment or health technology. Theoretical lectures will introduce the basic concepts of pharmaeconomics and HTA, defining how to measure and discount costs and benefits. Then, attention will be paid to the decision-making process, introducing relevant concepts and methods to inform policy makers or hospital managers on whether a new technology should be preferred with respect to the most relevant alternatives. The last part of the course will be devoted to applying the theoretical models thorough intensive lab sessions using the R package BCEA, one of the most popular statistical software to perform Bayesian cost-effectiveness analysis. During lab sessions two case studies will be presented and discussed.

After the course the student:

– will have knowledge about the main aspects of pharmaeconomics and HTA.

– will have knowledge of the main methods to perform cost-effectiveness analysis of new medical treatments/health technologies.

– will be able to apply the knowledge acquired during classes to discuss relevant topics on pharmaeconomics and HTA with an appropriate technical language.

– will be able to apply the knowledge acquired during classes to discuss results of a Bayesian cost-benefit analysis.

– will be able to apply the knowledge acquired during classes to perform independently a Bayesian cost-effectiveness analysis with the R package BCEA.

***COURSE CONTENT***

Part I: *Introduction to pharmaeconomics and health technology assessment*

– How to measure costs and case study

– How to measure outcomes (effectiveness, monetary benefits, utility)

– Quality Adjusted Life Years (QALYs), methods for extrapolation and case study

– Discounting (both for costs and outcomes)

Part II: *The decision-making process*

– Incremental Cost-Effectiveness Ratio (ICER) and the cost-effectiveness plane

– The National Institute for Health and Care Excellence (NICE) and relevant thresholds

– Net Monetary Benefit (NMB) and dominance

– Decision trees

– Markov models

– Introduction to dynamic models

– Bayesian analysis

– Introduction to sensitivity analysis (discrete and PSA)

– How to appraise a paper (checklist)

Part III: *Introduction to Bayesian Analysis and case studies*

– Bayesian analysis in health economics

– Basic concepts of health economic evaluation

– Doing Bayesian analysis and health economic evaluation in R

– Case studies: (i) vaccine and (ii) smoking cessation

Part IV: *Using R to perform Bayesian cost-benefit analysis (lab)*

– Basic health economics evaluation

– Cost-effectiveness plane

– Expected incremental benefit

– Health economic evaluation for multiple comparators and the efficiency frontier

– Probabilistic Sensitivity Analysis

– Modelling parameter uncertainty

– Value of information analysis

– PSA applied to model assumptions and structural uncertainty

***READING LIST***

Briggs-Klaxton-Sculpher, *Decision modelling for health economic evaluations*, Oxford University Press 2011.

Drummond-Torrance-Stoddart, *Methods for the Economic Evaluation of Healthcare Programmers*, Oxford University Press, 2015.

G. Baio-A. Berardi-A. Heath, *Bayesian Cost-Effectiveness Analysis with the R package BCEA,* Springer International Publishing, 2017.

***TEACHING METHOD***

Classes are organized as frontal and lab sessions. Frontal lectures provide knowledge necessary to understand fundamental concepts of pharmaeconomics and HTA. Lab sessions propose empirical analysis of case studies using models discussed throughout the course.

***ASSESSMENT METHOD AND CRITERIA***

Evaluation is based on a written exam lasting 60 minutes. The exam is made of three sections. Section 1 comprises 10 multiple choice questions on basic concepts discussed during the course. Each correct answer is worth 1 point; each wrong answer provides -0.5 points. Sections 2 and 3 are open questions and are thought to test the ability of students to apply the knowledge acquired during the course and to communicate using key concepts that they have learned. Instructors will evaluate the completeness and accuracy in answers to mark exams. During the second part of the course students will have the option to prepare a group project that will consist of a replication of an empirical application discussed during lab sessions. Group projects will be discussed and evaluated and will contribute to 30% of the overall evaluation of the second part of the course.

***NOTES AND PREREQUISITES***

Students are required to have basic knowledge of key concepts in health economics and in statistical inference and regression analysis to fully understand the arguments discussed during the course.

Students are kindly asked to refer to the Balckboard website for updated information and additional teaching material related to the course.

In the event that the health situation related to the Covid-19 pandemic will not allow for in presence frontal lectures, lectures will be guaranteed online and students will be promptly informed.