UNIVERSITÀ DI PAVIA

Anno Accademico 2020/2021

MEDICAL DECISION MAKING AND DECISION ANALYSIS

Enrollment year	2020/2021
Academic year	2020/2021
Regulations	DM270
Academic discipline	ING-INF/06 (ELECTRONIC AND INFORMATION BIOENGINEERING)
Department	DEPARTMENT OF ELECTRICAL,COMPUTER AND BIOMEDICAL ENGINEERING
Course	BIOENGINEERING
Curriculum	Sanita' digitale
Year of study	1°
Period	1st semester (28/09/2020 - 22/01/2021)
ECTS	6
Lesson hours	56 lesson hours
Language	Italian
Activity type	WRITTEN AND ORAL TEST
Teacher	QUAGLINI SILVANA (titolare) - 6 ECTS
Prerequisites	Basic knowledge of probability theory is required. For the practical part, a certain familiarity with the use of the PC (Windows) is required.
Learning outcomes	The aim of the course is to provide the methodologies to model complex medical problems, in which decisions are required in the presence of uncertainty and / or taking into account patient preferences and / or multi-attribute utility functions (for example when balancing costs and benefits). Diagnostic, therapeutic and monitoring problems can be treated. At the end of the course, the student must be able to formalize a decision-making problem, identifying the variables of the domain and choosing the most suitable formalisms, both for the purpose of acquiring knowledge (interaction with the medical counterpart for the construction of the model and interaction with the patient for the elicitation of preferences), and for the purpose of solving the problem. Among the classes of decision-making problems, particular emphasis will be given

	to the economic evaluations prior to the decision on whether or not to start a health program. Ample space will also be given to the practical use of IT tools for the resolution of decision-making models.
Course contents	1. Introduction: uncertainty and preferences as fundamentals of decision problems 2. Brief review of the basic concepts of probability theory to. some probabilities of fundamental importance in medicine b. Bayes' theorem and its use in diagnostics c. probabilistic networks d. use of software for probabilistic networks 3. The decision theory : to. quantification of the value of an outcome (state of health) b. methods for the quantification of utilities (standard gamble, time-trade-off, rating scale) c. utility waiting for a decision d. probabilistic dominance of one strategy over the other possible ones 4. Decision trees a. methodologies for construction and resolution b. use of a software for the management of decision trees c. sensitivity and threshold analysis, univariate and multivariate d. representation of Markov processes within a decision tree 5. Influence diagrams to. methodologies for construction and resolution b. use of software for influence diagrams 6. Economic evaluations of health programs to. cost-effectiveness, cost-benefit, cost-utility analysis b. Reference thresholds for cost / effectiveness ratios c. critical reading of a literature article on the subject
Teaching methods	lectures and computer exercises with Genie software for probabilitic networks and TreeAge Pro Healthcare for decision trees
Reccomended or required readings	M.C. Weinstein, H.V. Fineberg L'analisi della decisione in medicina clinica, F. Angeli Editore, 2008 R. Tarricone, Valutazioni economiche e management in sanità. Applicazioni ai programmi e tecnologie sanitarie, Milano, McGraw-Hill, 2004. Course notes in Italian are also available
Assessment methods	1- practical test: carrying out a decision tree exercise on the computer 2- oral exam: questions on all the topics of the course
Further information	
Sustainable development goals - Agenda 2030	$lbl_legenda_sviluppo_sostenibile