# **Healthcare Logistics Elective Package**



Healthcare Logistics	
Offered by	Department of Industrial Engineering and Innovation Sciences
Language	English
Primarily interesting for	Students Industrial Engineering, Mathematics, Mechanical Engineering, Biomedical Engineering, Psychology & Technology
Prerequisites	Basic probability and Calculus, modeling knowledge
Contact person	dr. ir. Nico Dellaert (n. <u>p.dellaert@tue.n</u> l)

### **Content and composition**

The healthcare industry has become one of the major industries and is still growing fast. Nowadays, many engineers find employment in hospitals and other health care institutions. This pair of courses offers you an excellent introduction to this field. The first course considers information systems that support healthcare operations, the second course provides a general introduction to the decision making in healthcare logistics and detailed mathematical models enabling a proper analysis of alternatives.

Course code	Course name	Scheduled
1BK00	Healthcare Information Systems	Offered in Q4, preferably year 1
1CK110	Healthcare Management and Modelling	Offered in Q1, in year 2 or year 3

You can choose a single course, or both courses as a coherent package.

### **Course description**

#### Healthcare Information Systems, 1BK00

The course provides an introduction to major information technology and information management functions within healthcare organizations. Health data, information and knowledge is reviewed, and functionality of various systems that use this information is discussed (e.g. electronic patient records, computerized provider order entry, etc.) Process-aware information systems in the healthcare are also discussed, as well as advanced business intelligence, clinical decision support and management information systems for the healthcare. In addition to the technology, methods for acquisition, implementation and management of healthcare information systems are considered in the remainder of the course.

The lectures are interactive. Classical teaching is interchanged with plenary discussion, group discussion and small targeted assignments. It is expected that the students are prepared for the lecture by studying the relevant material beforehand. During the assignments, students obtain hands-on experience in designing, evaluating and managing healthcare information systems. Practice lectures are coupled to the assignments and are meant to discuss the case/assignment as well as engage in discussions with guest lecturers from industry. Participation to practice lectures is mandatory.

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#### Healthcare Management and Modelling, 1CK110

In this course we develop a framework and conceptual models for patient logistics, where at different levels (strategic, tactical and operational) decisions are taken with respect to the patient demand and resource availability. These conceptual models will be transformed into mathematical models. The mathematical models will also be applied to infection diseases and organ transplantation.

Managing healthcare processes has two important aspects: the patient demand for care and the capacity of care providers. Balancing demand and capacity is essential in healthcare management. In this course we consider a planning framework for healthcare logistics, with control decisions on each hierarchical level for the patient flow and the care capacity. Based upon this framework, we will describe the logistic decisions that hospitals have to take, such as admission planning, bed planning, nurse planning and show the conceptual models for decision making.

Another part of the course will focus on the detailed modeling of healthcare problems and on the analysis of these problems. The first modeling part addresses mathematical modeling in epidemiology. Mathematical models can project how infectious diseases progress to show the likely outcome of an epidemic and help inform public health interventions. The second modeling part focuses on optimal decision making in organ transplantation. Decision making requires complex mathematical models, as uncertainty plays a big role, patients may have different urgencies and the outcomes of the transplantation may be different. We will use simulation models to see the performance of the various approaches

The healthcare management part of the course is interactive, where students read the material beforehand, prepare questions, give feedback and even present the material in the class. For those who cannot actively participate in class, a 'self-study' alternative is offered. The modeling classes are especially useful to get familiar with the mathematical modeling and simulation language. This is a course with many assignments (40% group work), with deadlines spread over 10 weeks.