Course Package

Digital Health – Q2

Name module	Digital Health – Q2
Educational programme	MSc Health Sciences
Period	Second quartile of the first semester – Q2
Study load	15 ECTS
Coordinator	A.H Prins

Digital Health			
Quartile 1	**Quartile 2**	**Quartile 3**	**Quartile 4**
	Implementation of Digital Health Interventions 202500028 (5 EC)		
	eHealth Technology 202200149 (5 EC)		
	Monitoring & Persuasive Coaching 201600029 (5 EC)		

Required preliminary knowledge: Basic knowledge of Excel.

Health Technology Implementation – in progress

202200149 - **eHealth Technology for Remote Patient Monitoring and Decision - making**

In Telemedicine we study theories, approaches and systems that focus on treating and assisting people in managing chronic health conditions or lifestyle changes in their own daily environment thereby supported by health care professionals when needed (Telemedicine or eHealth). To understand these systems, analyze them and to design them, we need to understand the health issues and problems that have to be addressed by the telemedicine system and we need to understand what the suitable building blocks and architectures are to design these systems. Furthermore, we need to be able to evaluate the system and understand how they can be implemented in everyday care practice.

Both elderly and people with chronic diseases are more viable to become victim of all kind of complaints and with the consequence of having problems with finding a balance between work and private life. Not only the number of patients seeking help for their health problems is increasing, but the health problems they report are also more complex. The number of people with chronic diseases is growing and almost half of them have multiple complex chronic conditions (multimorbidity). Complex chronic conditions pose a challenge for healthcare as it heavily impacts a person's quality of life physically, mentally and socially. Also, it consequently imposes a high burden on the healthcare system in terms of the complexity of treatment and care delivery, manpower and costs, because of the need of receiving complex and long-term care from multiple healthcare professionals. Since health, work and well-being are closely and powerfully linked, they need to be addressed together. As a consequence, in many cases the

conventional 'one size fits all' treatment approach is no longer sufficient, and a more personalized approach is needed.

Current disease management and monitoring of patients with a complex chronic condition(s) now relies heavily on information acquired during time-based scheduled visits when patients are usually stable, whereas the actual symptoms and changes during common daily life triggers are not quantified. Follow-up of relevant physiological parameters at home (telemonitoring) can provide important quantitative insights into the severity and dynamics of a chronic disease. Next, the data will be analysed and interpreted to create targeted treatment via e.g. clinical decision-support systems. Benefits are expected to arise from earlier initiation of appropriate treatment resulting in less severe complications, accelerated recovery, and reduced healthcare utilization. In addition, telemonitoring can assist patients in their self-care behaviour and can be used to develop personalized coaching and feedback for the individual person. Especially supporting people in having a healthy lifestyle is important as for example a sedentary lifestyle is one of the main risk factors for all kind of health problems such as cardiovascular diseases, COPD, diabetes and musculoskeletal problems and because of the existing evidence that being active contributes positively to feeling healthy and quality of life. Although people do recognize the need for a more healthy lifestyle, they often find it difficult to get started and/or to stay motivated. Technology-supported lifestyle applications, focusing at physical activity, stress and nutrition, are expected to help people to continue contributing to society, the marketplace and the economy.

As such there is an ongoing development of patient monitoring and treatment outside the hospital using telemonitoring and telemedicine technology, using analysis and interpretation of data from existing and novel sensing methods in the wider clinical and daily life context. Such a telemedicine system can be decomposed into four main functional building blocks

1. Monitoring – this part of the system takes care of sensing relevant (health-related) parameters and whenever needed environmental parameters. It will often include some data processing so as to remove measurement artifacts or to extract basic features from the sensor data. Monitoring may also include the transfer of data to some local or remote data-store facility, and it may include presentation of the (raw) data.

2. Data Analysis – this part of the system takes care of analysing and interpreting the data with respect to biomedical or clinical metrics, or to estimate the state (either physical or mental) of the data.

3. Decision Support – In decision support the outcomes of the analysis are used to make decisions on whether or not action should be undertaken and which action. The question here is how we can derive and construct decision models and how should these be used.

4. Feedback and Coaching – Once a decision has been made, proper feedback and coaching to the user is needed in order to effectuate the action and/or move the user into the desired direction.

This course is about the design and development of an end-to-end telemedicine system for remote monitoring and coaching by addressing these four different building blocks, to enable personalized intervention of the complex chronic condition, focusing on long-term care and healthy lifestyle (nutrition, physical activity).

201600029 - **Monitoring & Persuasive Coaching**

Through the digitalization of society, it's becoming increasingly common to use technology to support our health and wellbeing. This is referred to as eHealth, which is an overarching term for the use of technology - often information and communication technologies - to improve health and healthcare. eHealth technologies can be used to collect a boundless amount of personal data: they can for example be used to monitor a person's physiological state, their location, or subjective wellbeing. These data can be translated into meaningful information, which can be used to coach people. However, data is not just important for coaching purposes; it can also be used during the development process of eHealth technologies. Consequently, technology and data are intertwined and are becoming increasingly important for our health and wellbeing.

During this course we will focus on persuasive monitoring and coaching eHealth technologies. You will learn more about the role of data in the development, design and evaluation of technology. Persuasiveness also takes a central place in this course, which refers to technologies which are designed in such a way that they can influence attitudes and behaviours of people. You will learn about the relationship between monitoring, coaching, health, data and persuasiveness by gaining hands-on experience with these concepts. Together with one other student, you will work

on three different projects that are based on existing research projects. The structure of this course is based on the CeHRes Roadmap, and each project highlights a different phase of the Roadmap,

1. Collecting quantitative and qualitative data to learn more about a health problem and possibilities for improvement;
2. Developing a prototype of a persuasive monitoring and coaching technology based on an analysis of behavior;
3. Analyzing log data to assess and improve adherence to technology.

After finishing this course, you know why thorough development, implementation and evaluation of coaching and monitoring technology in healthcare are important. You will also have skills to use data during these processes. You can relate this to all five developmental phases of the CeHRes Roadmap.