Chulalongkorn School of Integrated Innovation

Health Challenges & Innovative Solutions

*Dr Sebastien BERTIN-MAGHIT, PhD*

1. **Course Number** 5604311
2. **Course Credit** 3 Credits
3. **Course Title** Health Challenges & Innovative Solutions
4. **Instructor / Academic Staff** Dr Sebastien BERTIN-MAGHIT
5. **Condition (Prerequisite, Corequisite, Concurrent)**

Previous or concomitant attendance to *“Next-Gen Therapies”* is highly recommended.

Previous attendance to *“Innovation in Health & Wellbeing”* and *“Public Health: Health Promotion and Health Security”* is a plus.

1. **Status (Required/Elective)** Elective
2. **Hours / Week** 3 hours
3. **Course Description**

This course explores the most pressing current health challenges and demands students to mobilise their knowledge and do some literature research to propose innovative approaches and solutions for addressing them. Some innovative solutions will be presented by the teachers and by students, discussions will be conducted to identify their implementations in clinical settings and their limitations. Teachers will conduct students discussions to imagine possible solutions in the next decades. Topics include aging, emerging infectious diseases, non-communicable diseases, healthcare technologies, and policy considerations.

This course intends to provide a comprehensive overview of contemporary health challenges and to stimulate students to identify creative and practical solutions for addressing such challenges. This course will prepare students for careers in healthcare innovation, but also in public health, or in healthcare policy and regulations.

1. **Course Content**

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| **Session** | **Module** |
| 1 | **Aging healthily**. Thailand has joined developed countries as an aged population country and is expected to reach the super aged society status in the next decade. What does it mean for the country and how to manage this fast-aging process? How can new technologies and biotechnologies help tackle this issue and allow the population to age healthily? |
| 2 | **Communicable Diseases 1: latent & persistent infections**. Learn about some latent infections that are indirect public health issues as they have been shown to highly increase cancer risks (examples of EBV, HBV, HPV). Chronic viral infections that are reservoirs for potential future outbreaks (example HIV). Should we treat symptoms, should we treat infections? How to prevent and/or cure such infections? |
| 3 | **Communicable Diseases 2: emerging infectious diseases**. Understand pandemics and outbreaks. Analyse the consequences, both medical and economic, of outbreaks/pandemics. Case studies using examples such as COVID-19, Dengue, Ebola. What should be the public health response? How to be prepared? How can new technologies help? |
| 4 | **Non-Communicable Diseases 1: chronic diseases causes and consequences**. Using three examples, type 2 diabetes, cardiovascular disease, high blood pressure, learn about current NCDs epidemics, their possible causes and their consequences on quality of life, on comorbidities, on country economics (reduced efficacy of manpower, higher social welfare costs). |
| 5 | **Non-Communicable Diseases 2: chronic diseases preventions and treatments**. Discuss the ways to better prevent chronic diseases, especially with modern technologies (health status tracking, risk predictions, AI health analysis…). Understand the lifestyle factors in preventing and possibly treating some chronic diseases. Analyse the current treatments, their limitations and suggest novel therapies using innovative technologies. This module will be a mix of lecture and students’ research projects presentation. |
| 6 | **Non-Communicable Diseases 3: cancer**. What is cancer, how does it grow? What are the causes of cancer (genetic predispositions, environmental triggers, chemicals, radiations…)? The current prevalence of cancer in the world, in ASEAN and in Thailand. |
| 7 | **Non-Communicable Diseases 4: cancer treatments**. How to better diagnose and treat cancer, what can new technologies bring to the table to solve the cancer issue? How to detect cancer better and earlier? New solutions for prediction and detection. Limitations, regulatory considerations. |
| 8 | **Access to medical services 1**. Modern technologies in the medical field often mean expensive, bulky, fragile equipment and/or highly skilled staff, which reduces the easy spreading of such technologies. In this context, how to bring better medicine to everyone? In countries like Thailand with few big highly urbanised areas and more remote, dense-less regions, not everyone is equal towards medical services access. In this context, how can new technologies fill the gaps? How to implement telehealth, how to democratise teleconsultation? And how to make teleconsultation really effective? How to get all patients’ data to the physician in real time accurately? How to conduct some medical tests in areas with lack of equipment and skilled medical staff? How to get people living in remote areas acquainted to modern digital health technologies? |
| 9 | **Digital Health solutions**. Can AI be a first line worker in medicine? What are the current digital health devices, what do they bring and what are their limitations? Presentations by students of wearable health tech and monitoring technologies for consumers (ECG, blood pressure, glycemia, falls…). |
| 10 | **Physical disabilities and infirmities**. Can we fully repair body disabilities or infirmities? What can bionics and cybernetics bring today? Replace limb with robotic limbs or regrow some tissues and organs. Walk again after spine injury. |
| 11 | **Stress and mental health**. Is stress on the raise today? How does this affect mental health and how can new development in digital techs and neurosciences provide some medical/wellness relief? How to diagnose stress with biomarkers or body parameters measurement? Science and marketing, the importance to get the right validated information. |
| 12 | **Neurodegenerative diseases**. Brief presentation of Alzheimer’s disease, Parkinson’s disease, amyotrophic lateral sclerosis, and their current treatments in Thailand. How can new digital and bio technologies improve early detection of these diseases and provide better treatment? |
| 13 | **Future Health Challenges**. What can we foresee for the 2 or 3 next decades? Are there new trends regarding health and wellness? Will cancer be cured in 20-30 years? Would damaged organs/tissues be easily replaced in the future? Would new technologies reach the human dream of immortality? Can neuroscience download your mental persona *in silico*? Are immortal beings seen in SF movies close to our reach thanks to technology? Is it ethically or progress or not?  Open discussion on what digital and bio technologies can do and how to use such tools. Are freedom and equality of human beings threatened by new health technologies? Or would these technologies free us more and erase our physical inequalities? |
| 14 | **Proposing Innovative Solutions 1**. Students will be asked to choose one topic within the current health challenges and work in small groups in class and outside to develop a short proposal to address the challenge in an innovative way. |
| 15 | **Proposing Innovative Solutions 2**. Groups will present their brief proposals and class will analyse the relevance, the feasibility and the possible acceptance of the proposal by the general population and by regulators. |

1. **Instructor**

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| **Name** | **Contact number** | **Email** |
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