BIOMEDICAL ENGINEERING SEMINAR SERIES:
Model-based Therapeutics – Modeling, computers and the future of healthcare

Professor Chase received his B.S. from Case Western Reserve University in 1986 in Mechanical Engineering. His M.S. and PhD were obtained at Stanford University in 1991 and 1996. He spent 6 years working for General Motors and a further 5 years consulting in Silicon Valley, including positions at Xerox PARC, GN ReSound, Hughes Space and Communications and Infineon Technologies AG, before coming to the University of Canterbury in 2000. His fundamental research interests focus on the intersection of engineering and clinical practice, primarily in intensive care. Dr. Chase has published over 1000 international, refereed journal and conference paper, as well as 15 US and European patents, founded 2 startup companies, and is a Fellow of the Royal Society of NZ (FRSNZ), the American Society of Mechanical Engineers (FASME) and IPENZ (FIPENZ).

Wednesday, February 22
1034 Emerging Technologies Building
9:10 a.m. to 10:00 a.m.

Healthcare costs rise on average 7-11% per year, and in the last two years, healthcare spending in the OECD has failed to keep up to even the 2.4% per year increases it had been maintaining. Thus, the cost of healthcare has grown from 2-3% of GDP 30+ years ago, to ~10% of GDP today in the OECD. Far more critically, the failure to keep up means the equity gap, the difference between what we can afford and the demand (in cost) for healthcare, is growing even, or is that ever?, more dramatically with significant growing social, political and, of course, economic impacts. Much of this issue is driven by interactions between uncontrollable demographics around aging, sedentary lifestyles and chronic diseases.

Within this toxic economic milieu, critical care, the delivery of health care in the intensive care unit treats less than 1% of hospital patients but comprises ~10% of healthcare costs, averaging around 1% of GDP in the OECD. Hence, the ICU, with its excessive use of technology, is a prime target for reducing cost and improving care simultaneously, through the use of modeling, computation and (traditional) automation mixed with (emerging) data management.

This research presents a technical and clinical overview of the research of my group, and associated eTIME consortia (engineering Technology and Innovation in MEdicine). In particular, it focuses on how we use engineering methods and modeling to create personalised, next-generation sensors, diagnostics and decision support to automate and guide (improved care). The works center on three core therapies of ICU medicine: glycemic control; cardiovascular monitoring and management; and mechanical ventilation.

Importantly, each has its own less acute ward and outpatient chronic disease analog providing a route towards developing therapies in hospital for eventual dissemination to outpatient care for chronic disease in the home or community.