MEMORY BOUND COMPUTING

Memory is an essential component of computing and information processing. The Memory-Compute von Neumann load-store architecture is reaching its limits in computational throughput and energy efficiency due to limitations from the bandwidth and energy per bit of moving data to and from the memory technology. Further advances in computing need to look to 'reinventing' the compute-memory system, including device physics, physical implementation, and memory hierarchy architecture. This short course provides eight lectures from world leading researchers for the key areas where compute-memory architecture and circuit design innovations are occurring in computing. This short course starts with a lecture on the compute-memory trends and applications for high performance computing, followed by seven cross-disciplinary lectures on key developments covering compute architecture, memory system design/circuits and security that overcome the limitations of advanced memory technologies on computing. This course is for students interested in learning about these aspects of computer architecture and memory outside of the actual memory process technology development.

Ian Young is a Senior Fellow and director of Exploratory Integrated Circuits in the Technology and Manufacturing Group of Intel Corporation. He joined Intel in 1983 and his technical contributions have been in the design of DRAMs, SRAMs, microprocessor circuit design, Phase Locked Loops and microprocessor clocking, mixed-signal circuits for microprocessor high speed I/O links, RF CMOS circuits for wireless transceivers, and research for chip to chip optical I/O. He has also contributed to the definition and development of Intel's process technologies. He now leads a research group exploring the future options for the integrated circuit in the beyond CMOS era.

Ian Young received the Bachelor of Electrical Engineering and the Master Eng. Science, from the University of Melbourne, Australia. He received the PhD in Electrical Engineering from the University of California, Berkeley. He is the recipient of the 2009 International Solid-State Circuits Conference's Jack Raper Award for Outstanding Technology Directions paper. He received the 2018 IEEE Frederik Philips Award "for leadership in research and development on circuits and processes for the evolution of microprocessors". Ian Young is a Fellow of the IEEE.