2018 Syllabus – Summer Course (6/25-6/29/2018)

课程名称: **大数据时代的系统芯片设计（SoC Design in AI-Big Data Era)**

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课程描述（Course Description）

This course will discuss the impact of big data on concurrent technology in the integrated circuit (IC) field especially on SoC (system-on-chip) design, its integration and implementation.

In recent years, AI has become a hot topic and invoked urgent discussions on from Machine Learning to Deep Learning hence related IC designs. These include, e.g. CMOS neuromorphic design based on CNN algorithms, HSA/ASIC/FPGA designs in a CPU/GPU/DSP kernel, in addition to various usage of memories such as HBM/3D/SDD. IC in/for AI on the stake needs are arrived from big data generation via the Internet of Things (IoT), where the data are collected via the Cloud, converted via an IoT device to electronic signal, which are stored, analyzed, processed and protected. In all of these steps, IC/SoC chips play a key role. AI/IoT/Cloud/SoC are tightly bundled to form and to touch base the foundation of SoC design in the big data era.

To meet the big data era needs, for IoT device and electronic end products, used either in wearables or portables, in handsets or in communicational, in computational and transportation appliances such as automobiles, it has brought in increasingly complexity of the SoC design, as well as many challenges to the engineering team. The issues to deal with include 1) at system level design to run verification using various models; 2) to achieve high performance of clocks; 3) to use ultra low power features; 4) to produce high reliable products at high yield. The importance of design for reliability has become not only a quality measure for high-end products, but also a necessity in today's consumer electronic products.

The class will focus on the emerging and developing technology from AI and Big Data to IoT/Cloud related and applied in today's communication, computing and consumer products. Throughout the class, the students are expected to learn of the state of the art of SoC design methodology, with the comprehensive and compressed teaching materials.

主要教学内容 （Course Contents）:

(1) Impact of Big Data (in AI and IoT) on SoC Designs

(2) IDM/EDA/IP and System Designs

(3) SoC/IC Design and Its Implementation

(4) Design For eXcellence (DFX)

(5) Advanced Technology and Summary