**Course Title:**

co-Packaged Si Photonics: Opportunities and Challenges

***Course Instructor and Affiliation:***

Amr S Helmy, Professor University of Toronto

**Course Objective and Outline:**

This course will overview the tools, technologies and approaches which enable Si photonics to empower the co-packaged optics initiatives pursued by the industry presently. The capabilities offered by existing Si photonics dictate, to a large extent, the advantages offered by co-packaged optics to the CMOS eco-system. Abilities for co-packaged topics to positively fuel scaling system in a package (SiP) by enhancing the interconnection density will be used as an example in this course.

This comprehensive course aims to provide a thorough exploration of the fundamental tools, cutting-edge technologies, and innovative approaches that underpin the remarkable potential of Silicon (Si) photonics in driving and supporting the ongoing co-packaged optics initiatives within the current industry landscape. As the industry places increasing emphasis on co-packaged optics as a strategic direction, understanding the intricacies of Si photonics becomes pivotal, as its capabilities and functionalities wield a significant influence over the advantages that co-packaged optics can bring to the broader CMOS ecosystem.

**Who Should Attend:**

The goal of this course is to provide the participants with a multifaceted analysis of Si photonics, examining its foundational principles, engineering intricacies, and diverse applications. By grasping the core attributes of Si photonics, course participants will gain a profound insight into the pivotal role it plays in shaping the co-packaged optics landscape. One noteworthy aspect that will be highlighted is how the inherent capabilities of Si photonics serve as a linchpin for the advantages conferred by co-packaged optics. This relationship will be elucidated through illustrative examples, such as the way co-packaged optics can significantly augment the scalability of Systems in Package (SiP) through heightened interconnection density.

Through a systematic exploration of these interconnected concepts, participants will not only foster a comprehensive understanding of Si photonics and co-packaged optics but also develop a discerning perspective on how these elements synergistically contribute to the evolution of modern packaging technologies. By the course's conclusion, attendees will be equipped with not only theoretical knowledge but also practical insights that can be harnessed in real-world scenarios, enabling them to make informed decisions and innovations in the dynamic realm of co-packaged optics and Si photonics.

As the industry landscape continues to be shaped by rapid advancements, this course stands as an invaluable resource for those seeking to navigate the intricate interplay between Si photonics and co-packaged optics, ultimately empowering them to drive forward advancements in system integration, interconnectivity, and performance optimization.

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**Instructor Biography:**

Amr S. Helmy is a Professor in the department of electrical and computer engineering at the University of Toronto. Prior to his academic career, Amr held a position at Agilent Technologies - UK, between 2000 and 2004. At Agilent his responsibilities included developing lasers and monolithically integrated optoelectronic circuits. He received his Ph.D. and M.Sc. from the University of Glasgow with a focus on photonic integration technologies, in 1999 and 1995 respectively.

His research interests include photonic device physics, with emphasis on plasmonic nanostructures, nonlinear and quantum photonics addressing applications in information processing / sensing, and data communications. Amr is an active volunteer and leader of the IEEE Photonics Society, currently serving as an Elected Member of the Society’s Board of Governors and as a Distinguished Lecturer. He was also the recipient of the Society’s 2019 Distinguished Service Award.