



# Fundamentals of Optical Wireless Communications

## Overview

The exponential growth of data traffic is a result of unlimited high-speed and ubiquitous broadband wireless access to accommodate the ever-increasing utilization of Internet and multimedia services. To transport the increasing amount of data to the end users within an acceptable delay, the current system is experiencing severe congestion of the radio frequency (RF) system and wireless traffic bottleneck. Complementing the existing wireless RF solutions, optical wireless communications (OWC) is an affordable and attractive high-data rate technology. The OWC technology is poised to become a promising candidate for the next generation broadband wireless access to resolve the existing “last mile” and “last-leg” access network problems. This is mainly due to the vastly attractive features of OWC technology, including no licensing requirements or tariffs for its utilization, virtually unlimited bandwidth for providing near-optimal capacity and supporting high-speed applications, a green technology with high energy efficiency due to low power consumption, reduced interference and fading immunity, high scalability and re-configurability, a high degree of security and privacy against eavesdropping, and cost-effectiveness in terms of the price per bit.

This short course is primarily targeted towards graduate students and researchers who have no prior knowledge in optical communication, but are interested in expanding their research topics to this field. The course will be organized in three modules including free-space optical communications, visible light communications, and emerging optical wireless technologies (such as ultraviolet communication, optical camera communication, and indoor wireless location using LEDs). We will study in-depth the fundamental principles of each optical wireless technology and present some latest research results and trends.

<b>Modules</b>	<b>Introduction (Review of pre-requisites)</b>	<b>14-01-2018 (Optional)</b>
	<b>Module 1: Free-Space Optical Communication</b>	<b>15-01-2018 to 16-01-2018</b>
	<b>Module 2: Visible Light Communication</b>	<b>17-01-2018 to 18-01-2018</b>
	<b>Module 3: Emerging Optical Wireless Communication Technologies</b>	<b>19-01-2018</b>
<b>You Should Attend If...</b>	<ul style="list-style-type: none"> <li>▪ You are a student (B.Tech./M.Sc./M.Tech./Ph.D.) and aspiring researcher within broad domain of communication engineering.</li> <li>▪ You are an Executive/engineer or researcher from manufacturing, service and government organizations including R&amp;D laboratories.</li> <li>▪ You are Faculty and staff from reputed academic institutions and technical institutions.</li> </ul>	
<b>Fees</b>	<p>The participation fees per person for attending the course is as follows:  <b>Participants from abroad: US \$400</b>  <b>Industry/ Research Organizations: Rs. 10,000/-</b>  <b>Academic Institutions:</b>  <b>Students: Rs. 2950/- (For SC/ST students course fee is Rs.1600/- only)</b>  <b>Non-Students: Rs. 5900/-</b></p> <p>The above fees include all instructional materials, computer use for tutorials, free internet facility, tea and snacks. The course fee is inclusive of 18% GST as per institute norm. The participants may avail single bedded shared accommodation and food (breakfast, lunch and dinner) <b>if requested</b> on additional payment basis.</p>	

## The Faculty



**Dr. Julian Cheng** Julian Cheng received a B. Eng. Degree (First Class) in electrical engineering from the University of Victoria, Victoria, BC, Canada in 1995, a M.Sc. (Eng.) degree in mathematics and engineering from Queen's University, Kingston, ON, Canada in 1997, and a PhD degree in electrical engineering from the University of Alberta, Edmonton, AB, Canada, in 2003.

In July 2006, He joined the School of Engineering, Faculty of Applied Science, The University of British Columbia (Okanagan campus) as an Assistant Professor. He is now a Full Professor in the same School. Previously, Dr. Cheng worked for Bell Northern Research (BNR) and Northern Telecom (later known as NORTEL Networks), and taught at both University of Alberta and Lakehead University. His current research interests include digital communications over wireless channels, orthogonal frequency division multiplexing, spread spectrum communications, statistical signal processing for wireless applications, and optical wireless communications. Currently, he serves as an Associate Editor for IEEE Transactions on Communications, IEEE Transactions on Wireless Communications, IEEE Communications Letters, and IEEE Access. He also served as a Guest Editor for a special issue of IEEE Journal on Selected Areas in Communications on optical wireless communications. Dr. Cheng is also a Senior Member of IEEE. He also serves as the President of Canadian Society of Information Theory.



**Dr. Prabhat Kumar Sharma** is an Assistant Professor in the Department of Electronics and Communication Engineering, Visvesvaraya National Institute of Technology, Nagpur (India). He received his Ph.D. degree in wireless communications from University of Delhi, New Delhi, India in 2015. He has authored several papers in the journals and

conferences of international repute. His research interests include optical wireless communication, cognitive radio, full duplex communication and power line communications. He is presently serving the Elsevier AEU journal as an Editor. Dr. Sharma acts as a regular reviewer for reputed journals such as *IEEE Transactions on Communications*, *IEEE Transactions on Wireless Communications*, *IEEE Communications Letters*, *IEEE Transactions on Vehicular Technology IEEE*, *IET Communications* and *IEEE Internet of Things Journal*. He is a recipient of Visvesvaraya Young Faculty Fellowship awarded by Ministry of Electronics and Information Technology, Government of India.

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## Course Co-ordinator

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