ETHICAL HACKING

COMPUTER SCIENCE & ENGINEERING

Instructor Name : PROF. INDRANIL SEN GUPTA (IIT Kharagpur **-** Computer Science and Engineering **)**

COURSE DURATION : Jul-Oct 2019 **CORE / ELECTIVE :** Elective **UG / PG:** Both

PRE-REQUISITES : Basic concepts in programming and networking
INTENDED AUDIENCE : Computer Science and Engineering / Information Technology / Electronics and Communication Engineering / Electrical Engineering
INDUSTRIES APPLICABLE TO : TCS, Wipro, CTS, Google, Microsoft, Qualcomm

COURSE OUTLINE : This is a fundamental course on ethical hacking that does not assume too much in terms of the technical background of the audience. Fundamental concepts in computer networking and information security will be covered, and hands-on demonstrations will be provided using easily available tools. At the end of this course, the participant should be able to develop scripts to exploit various vulnerabilities in networks and systems, and also come up with strategies to prevent them.

ABOUT INSTRUCTOR : Prof.Indranil Sengupta has obtained his B.Tech., M.Tech. and Ph.D. degrees in Computer Science from the University of Calcutta. He joined the Indian Institute of Technology, Kharagpur, as a faculty member in 1988, in the Department of CSE, where he is presently a full Professor. He had been the former Heads of the Department of Computer Science and Engineering and also the School of Information Technology of the Institute. He was also the Managing Director of Science and Technology Entrepreneurship Park (STEP), and the Professor-in-Charge of a Centre of Excellence in Information Assurance funded by the Ministry of Defense. He has over 30 years of teaching and research experience. He has guided 22 PhD students, and has more than 200 publications to his credit in international journals and conferences. His research interests include reversible and quantum computing, VLSI design and testing, and information security. He is a Senior Member of IEEE. He had been the General Chairs of Asian Test Symposium (ATS-2005), International Conference on Cryptology in India (INDOCRYPT-2008), International Symposium on VLSI Design and Test (VDAT-2012), International Symposium on Electronic System Design (ISED-2012), and the International Conference on Reversible Computation (RC-2017).

COURSE PLAN

Week 1**:**Introduction to ethical hacking. Fundamentals of computer networking. TCP/IP protocol stack.

Week 2**:**IP addressing and routing. Routing protocols.

Week 3**:**Introduction to network security. Information gathering: reconnaissance, scanning, etc.

Week 4**:**Vulnerability assessment: OpenVAS, Nessus, etc. System hacking: password cracking, penetration testing, etc.

Week 5**:**Social engineering attacks.Malware threats, penetration testing by creating backdoors.

Week 6**:**Introduction to cryptography, private-key encryption, public-key encryption.

Week 7**:**Key exchange protocols, cryptographic hash functions, applications.

Week 8**:**Steganography, biometric authentication, lightweight cryptographic algorithms.

Week 9**:**Sniffing: Wireshark, ARP poisoning, DNS poisoning.
Hacking wireless networks, Denial of service attacks.

Week 10**:**Elements of hardware security: side-channel attacks, physical unclonable functions.

Week 11**:**Hacking web applications: vulnerability assessment, SQL injection, cross-site scripting.

Week 12**:**Case studies: various attacks scenarios and their remedies.