JAYPEE INSTITUTE OF INFORMATION TECHNOLOGY

(Deemed University)

A-10, Sector 62, Noida, Gautam Buddh Nagar – 201 309 (U.P.)

AICTE Approved | UGC Approved | NAAC Accredited | NIRF Ranked

An Institution Dedicated to Excellence in Higher Education

Introduces Online Certificate Courses

5G Technologies and Future Wireless Communication

Preamble

Currently the whole word is interested in the deployment of 5G communication technologies. This course is a foundation course to make participants acquainted of 5G basics and underlying technologies. This course will give insight to, how the cellular communication will make transition from existing 4G systems to 5G systems.

Target Participants/ Industry: Fresh graduates, Industry personnel, students pursuing graduation, job seekers

Duration of the Course: 3 Months (including labs, evaluations)

Mode of Operation: Online

Number of Lectures of 1-hour duration: 40 Lectures

Number of Practical Sessions of 2 hours duration: 04 sessions

To be covered in each Lecture

Module-1 (Introduction to Mobile Communications): Introduction to Cell technologies, handoff, cellular capacity, 2G,3G, 4G standards. Basic Architectural difference in 2G, 3G & 4G systems with introduction to undelaying technology.

Module 2 (Wireless Channels): Multipath Propagation, Doppler spread, large and small-scale propagation models. Flat & frequency selective fading, Fast and slow fading, Various fading distribution -Rayleigh, Rician, Nakagami-m; $\alpha - \eta - \mu$ distribution; $\alpha - \kappa - \mu$ distribution; $\alpha - \mu$ distribution; $\eta - \mu$ distribution; $\kappa - \mu$ distribution, Link budgeting.

Module 3- (Introduction to 5G Technology): Evolution from 4G to 5G, 4G Protocol stack, 5G spectrum, Key capabilities of 5G

Module-4 (5G Architecture): 5G architecture, 5G RAN, ORAN, Network slicing, 5G frame structure

Module-5 (5G Waveforms): Orthogonal frequency division multiplexing (OFDM), Multi-carrier with filtering-Filter-bank based multi-carrier, Universal filtered OFDM, Non-orthogonal multiple access (NOMA), Sparse code multiple access (SCMA), beam division multiple access

Module-6 (5G Enabling Technologies): MIMO, Massive MIMO, beamforming, Machine-Type Communication (MTC), Massive MTC, Device-to-device (D2D) communications

Module -7 (5G applications and future wireless systems): Mm-wave communication, Cognitive radio, Dynamic Spectrum sharing, 5G and IOT, Introduction to Ns2 & python in context of Network design.

To be covered in each Practical Session

Brief topics

- Ns2 basics
- Basic wired network, Lan simulations
- Routing algorithms implementation.
- Wireless Ad-hoc network implementation
- Heterogenous network implementation.
- Pythons basics

Pre-requisite, if any: Basics of signal processing & digital communications

Schedule of the Classes: Saturday & Sundays 2 hrs

Name of the Faculty Coordinators: Dr. Alok Joshi & Dr. Samriti Kalia

Name(s) of the Faculty to be involved in conduction of the Course: Alok Joshi & Dr. Samriti Kalia

Minimum Qualifications for participants: Bachelors in engineering, students pursuinggraduation

Mode of evaluation of the participants after every 15 Lecture Sessions: Online quiz

Mode of evaluation of the participants after 02 Practical Sessions: Online quiz

For course related query please mail to:

Dr. Alok Joshi: *alok.joshi@jiit.ac.in*

For course registration, please click the link:

https://forms.gle/AkVidsjMp5ArfwNj7