



GLOBAL INITIATIVE OF ACADEMIC NETWORKS



Government of India
Ministry of Human Resource
Development

COURSE ON

Fundamentals and Applications of the Principles of Optimization to various disciplines: Engineering, Business, Life Sciences ,Social Sciences and Physical Sciences

Delivered by:

Dr. Chandrasekhar Putcha
Professor, Department of Civil and
Environmental Engineering,
California State University, Fullerton, CA,
USA.

Course Dates

July 17th – July 21st, 2017

Venue

IIT Indore, Simrol, Madhya Pradesh,
India

Host:
Discipline of Computer Science and Engineering, Indian Institute of Technology Indore



Course Overview :

Optimization is a very important tool which can be used when the objective to be obtained in a practical problem has lot of constraints. For example, a person has to design a big unit consisting of several components, the thing that is best for one component may be detrimental to other. Similarly, one may have to allocate the available resources in an organization to various units in an effective manner for the whole organization. Problems like this can easily be solved by using the concepts of Operations Research (OR) under which optimization principles are used. It is the intent of this course to first discuss the basics of optimization and discuss in detail the various topics related to general areas of optimization and then show practical applications. Such a course would be extremely useful to people from any industry as the topic of OR (Operations Research) and Optimization are interdisciplinary in nature.

Course Objectives :

- Exposing participants to the basic fundamentals of optimization
- Discuss Linear and Non Linear Programming Problems, Dynamic Programming Problems
- Discuss the concepts of Queuing Theory, Inventory Theory
- Applications of all the above useful topics to various disciplines such as Engineering, Business, Life Sciences, Social Sciences and Physical Sciences

Who can Attend :

Academicians from various universities, industry personnel, people from research organizations, engineers, non-engineers and people from any discipline, students from any discipline from any institution.

How to enroll :

Register online, before the deadline, which is **July 1st, 2017** on the <http://gian.iiti.ac.in/register.php>

How to pay course registration fees :

NEFT/RTGS :

Name of the Beneficiary: IIT Indore Project and Consultancy Account

Name of Bank: Canara Bank

Branch: Indore Navlakha

Beneficiary Account No. 1476101027440

Bank MICR Code : 452015003

Bank IFS Code: CNRB0001476

Demand Draft: Draw a DD in favor of:

Name of the Beneficiary: IIT Indore (Project and Consultancy Account)

Payable at: Indore

Course Schedule

| Lecture /Tutorial | Date | Time | Topics to be covered |
|-------------------|---------------------------|--------------|---|
| Lecture 1 | 17-07-2017 (Monday) | 9:30-10:30 | Concepts of Linear Programming ,Linear Programming Model, Formulating and Solving Linear Programming (LPP) Models, Essence of Simplex Method, Setting up Simplex method, Simplex method – tabular form Solution of LPP using Simplex Method, The Simplex Method in Tabular Form, The tableau method of Simplex algorithm. |
| Lecture 2 | 17-07-2017 (Monday) | 10.45 -11.45 | Special case of LPP Transportation problem – Formulation Constructing Initial Basic Feasible Solution (IBF) Northwest corner rule, Russell method , Vogel method |
| Tutorial 1 | 17-07-2017 (Monday) | 14:00-16:00 | Problem solving basic Simplex method, Transportation problems Examples in various disciplines of Engineering and other disciplines |
| Lecture 3 | 18-07-2017 (Tuesday) | 9:30-10:30 | Nonlinear Programming problems (NLPP) – Formulation and solution |
| Lecture 4 | 18-07-2017 (Tuesday) | 10.45 -11.45 | Decision making under uncertainty and Decision Trees |
| Tutorial 2 | 18-07-2017 (Tuesday) | 14:00-16:00 | Examples of Savvy Stock Selection and Practical Examples of Decision theory to various disciplines |
| Lecture 5 | 19-07-2017 (Wednesday) | 9:30-10:30 | Utility theory, concepts and Examples |
| Lecture 6 | 19-07-2017 (Wednesday) | 10.45 -11.45 | Lagrange Multipliers – Concepts and Applications |
| Tutorial 3 | 19-07-2017 (Wednesday) | 14:00-16:00 | Practical Examples of utility theory like Full Gofer broke Co. problem, Application of Lagrange Multipliers to various disciplines |
| Lecture 7 | 20-07-2017 (Thursday) | 9:30-10:30 | Principles of Dynamic Programming – (Deterministic and Probabilistic) |

Course Schedule

| Lecture /Tutorial | Date | Time | Topics to be covered |
|-------------------|--------------------------|--------------|---|
| Lecture 8 | 20-07-2017 (Thursday) | 10.45 -11.45 | Principles of Integer Programming, A Branch-and-Cut Approach to solving BIP (Binary Integer Programming). |
| Tutorial 4 | 20-07-2017 (Thursday) | 14:00-16:00 | Examples on Integer Programming |
| Lecture 9 | 21-07-2017 (Friday) | 9:30-10:30 | Game Theory |
| Lecture 10 | 21-07-2017 (Friday) | 10.45 -11.45 | Queuing Theory, principles and applications |
| Tutorial 5 | 21-07-2017 (Friday) | 14:00-16:00 | Examples of optimization principles (studied in the whole week) to various disciplines |

Course Completion Certificate :

A certificate is awarded jointly by IIT Indore and MHRD under the GIAN program.

Course Registration Fees :

Student Participants from India: Rs. 2000/-

Faculty Participants from India: Rs. 5000/-

Government Research Organization Participants: Rs. 8000/-

Industry Participants: Rs. 10000/-

Participants from abroad : US \$ 500/-

The above fee includes all instructional materials, computer usage at IIT Indore labs, free internet access as well as lunch for all lecture days.

Lodging and Boarding :

The participants will be provided with accommodation on a nominal payment basis at IIT Indore hostel. Charges are Rs. 250/- per person per night with two people sharing a room. Please reserve and confirm your room booking by emailing at hostel@iiti.ac.in (mention that course coordinator is Dr. Neminath Hubballi).

About Course Coordinators :



Dr. Chandrasekhar Putcha is a Professor in the Department of Civil and Environmental Engineering at California State University, Fullerton, CA, USA. He has been at this place since 1981. Before that he was on the research faculty at West Virginia University, Morgantown, WV and a post-doctoral fellow at University of Sherbrook in Canada. His research areas of interest are –Reliability, Risk Analysis, Optimization and Mathematical Modeling. Because of his interdisciplinary areas of research, Dr. Putcha has published more than 150 research papers in various disciplines such as Engineering, Business, Economics. Dr. Putcha has published more than 150 research papers in various disciplines such as Engineering, Business, Economics, Medicine, Kinesiology, Political Science and Sociology. He has done consulting work for several leading companies and received research grants from companies such as Boeing, Northrop Grumman Corporation (NGC) and from federal agencies such as – NASA, Navy, Air Force, US Army Corps of Engineers. Dr. Putcha received the campus-wide Outstanding Professor award at California State University, Fullerton in May, 2007. He is the first recipient of this award from College of Engineering in 44 years since this award was instituted in 1963 at California State University, Fullerton. Dr. Putcha has been in Academia for the last 40+ years involving various activities related to teaching and professional activities. Dr. Putcha is Fellow of American Society of Civil Engineers (ASCE). Dr. Putcha did his Ph.D. and M.S. in Civil Engineering from Indian Institute of Technology, Kanpur in 1975 and 1971 respectively and B.S. from IIT/BHU in 1969. He was the Head of Civil and Environmental Engineering Department at California State University, Fullerton (CSUF) from 1996-2002.



Dr. Neminath Hubballi is an Assistant Professor in the discipline of Computer Science at Indian Institute of Technology Indore, India. He earned his Ph.D. from the Department of Computer Science and Engineering at Indian Institute of Technology Guwahati, India. His areas of research interests include network and system security. Prior to the current role he was with corporate R&D centres of Samsung, Infosys Lab and Hewlett-Packard. He has several publications in the area of security. His publications have appeared in journals of IEEE, Elsevier and John Wiley publishers. He is a principle investigator for projects funded by DST. He is a regular reviewer in many security journals and conferences and also served as TPC member of several conferences. His notable research contributions include VoIP system monitoring for anomalous behaviour detection and false alarm minimization in intrusion detection systems. He was on the Indo-Israel round table meeting held at Tel Aviv University in 2015.