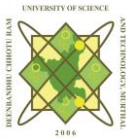


# The Three R's [Reliability, Robustness and Resilience] of Engineering Systems: Synthesis and Applications

9<sup>th</sup> - 13<sup>th</sup> October, 2017



**Deenbandhu Chhotu Ram University of Science and Technology**  
**Murthal (Sonapat): 131 039, Haryana**  
 (A Haryana State Government University, Accredited Grade "A" by NAAC)

**A Short Term Course under GIAN**  
 An initiative of the Ministry of Human Resource Development  
 Government of India



## Overview

There is tremendous interest these days to design, develop and sustain all types of complex engineering systems, including infrastructure, communications, software and hardware, logistics and distribution systems that are not only reliable and maintainable but are also robust, resilient and sustainable. The analogy is with the three R's which refer to the foundation of a basic skills-orientated educational program: **r**eading, **w**riting and **a**rithmetic. This course covers the three R's of engineering systems: **reliability, robustness and resilience**. The field of reliability sometimes has been narrow in its scope and we have not always integrated the methodology with recent emphasis on broader measures of system performance. We need new measures for system performance based on reliability, which are holistic, realistic and useful. The motivation for these new measures and their trends and applications are provided and their extensions and synthesis with measures of robustness and resilience is also covered. This is based on systems oriented, integrated and distributed, customer-centered, multi-state systems including fuzzy logic methodology. Examples and applications to infrastructure and other complex engineering systems, including health systems are developed and presented in this series of lectures and tutorials.

**Course participants will learn these topics through lectures, tutorials and case studies.**

<b>Day - 1</b>	Lecture - 1: Statistics and Reliability	Lecture - 2: Reliability & Maintainability: New Directions and Trends	Tutorial - 1: Trends and Directions for Robust Quality Engineering & Applications
<b>Day - 2</b>	Lecture - 3: Reliability Engineering	Lecture - 4: Development and Synthesis of Reliability, Robustness and Resilience of Engineering Systems	Tutorial - 2: How to achieve Safety first & Reliability primary?
<b>Day - 3</b>	Lecture - 5: Reliability Calculations - What, Why and When? How do we benefit?	Lecture -6: Generalized and Fuzzy Customer-Centric Reliability Performance Measures	Tutorial - 3: Integration of Quality and Reliability with Design for Six Sigma [DFSS]
<b>Day - 4</b>	Lecture - 7: Six Sigma in Education	Lecture - 8: TQM in Education	Tutorial - 4: Design for Six Sigma [DFSS]: Methodology and Application
<b>Day - 5</b>	Lecture - 9: System Safety Management and Engineering	Lecture - 10: Reliability Improvement and Optimization	Tutorial - 5: Reliability: Modelling, Analysis and Optimization
<b>You should attend if...</b>	<ul style="list-style-type: none"> <li>▪ Faculty from reputed Academic Institutions.</li> <li>▪ Executives, Engineers and Researchers from Manufacturing, Service and Government organizations including R &amp; D Laboratories.</li> <li>▪ Students at all levels (B. Tech./M. Tech./ M. Sc./MBA/Ph. D.)</li> </ul>		
<b>Fees</b>	The participation fees for taking the course is as follows: <b>Participants from abroad: US \$500</b> <b>Industry/ Research Organizations: INR 10,000</b> <b>Faculty from Academic Institutions: INR 2,000</b> <b>Students from Academic Institutions: INR 1,000</b> The above fee includes all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, free internet facility. The participants will be provided with accommodation on payment basis.		

## The Faculty



**Prof. Kailash C. Kapur**

Dr. Kailash [Kal] C. Kapur is a Professor Emeritus of Industrial & Systems Engineering in the College of Engineering at the University of Washington, Seattle. He was the Director of Industrial Engineering at the University of Washington from January 1993 to September 1999, professor till 2014. He was a Professor and the Director of the School of the Industrial Engineering, University of Oklahoma from 1989-1992 and a professor in the Department of Industrial and Manufacturing Engineering at Wayne State University, Detroit, Michigan from 1970 - 1989. Dr. Kapur has worked with General Motors and also with Ford as a Visiting Scholar. In addition, he has done extensive consulting and training for over 50 companies and international organizations. Dr. Kapur received the Ph. D. Degree in Industrial Engineering & Operations Research from the University of California, Berkeley, California. He received M. Tech. in Industrial Engineering and operations research from IIT, Kharagpur and B.S. in Mechanical Engineering from Delhi University. He has co-authored three books on reliability engineering [first book, *Reliability in Engineering Design*, John Wiley, 1977 has been used as textbook all over the world], over dozen book chapters and published over 100 research papers. He has given over 150 speeches and many as a keynote speaker at international conferences. He received the *Allan Chop Technical Advancement Award* from the Reliability Division and the *Craig Award* [twice] from the Automotive Division of American Society for Quality. He is a *Fellow* of American Society for Quality, a *Fellow* of the Institute of Industrial Engineers, and a *registered professional engineer*.



**Prof. Ramesh K. Garg**

**Dr. Ramesh K. Garg** born in India in 1970, is working as full Professor and Chairman in the Department of Mechanical Engineering at Deenbandhu Chhotu Ram University of Science and Technology, Murthal, Haryana, India. His research interests include industrial engineering and system design, reliability modeling & analysis, and computational techniques. Dr. Garg possesses an outstanding academic record and has a long experience of about 25 years in teaching, research and industries in the field of Engineering and Technology. He bears many mantles of a reputed builder of higher education departments, centers, programs and successful education administrator, an excellent teacher, an eminent researcher and also lauded as the harbinger of many useful academic innovative initiatives and reforms. He always played a major role, proving his capabilities and potential towards administrative, academic and financial leadership activities while working as Director - Principal of two technical institutions of the State Government of Haryana. He chaired technical sessions and made an oral presentation of research papers in various International conferences at abroad. He has guided five Ph. D. Dissertations and about 25 M. Tech. thesis and six more research scholars are pursuing their Doctoral research under his guidance. He has published about 50 research papers in various International and National Journals and Conferences of repute. He is an author of a Book on "Software Reliability Modeling and Selection: Software Reliability Models".

### Venue:

Conference Hall  
Saraswati Library Complex  
Deenbandhu Chhotu Ram  
University of Science & Technology  
Murthal (Sonipat): 131 039 Haryana

*The University is located in NCR on National Highway No. 1 (G. T. Road) about 50 km from ISBT, New Delhi towards Chandigarh and 8 km from the Sonapat Railway Station. The location of the University falls within one of the growing industrial belts of the State of Haryana extending from Kundli to Panipat.*

### Course Coordinator:

**Prof. (Dr.) Ramesh K. Garg**  
Professor and Chairman  
Mechanical Engineering Department  
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E-mail: [drkrgarg.me@dcrustm.org](mailto:drkrgarg.me@dcrustm.org)/  
[chairmanme@dcrustm.org](mailto:chairmanme@dcrustm.org)  
<http://www.gian.iitkgp.ac.in/GREGN>

Deenbandhu Chhotu Ram University of Science and Technology, Murthal (Sonapat), Haryana  
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An International Short Term Course on  
The Three R's [Reliability, Robustness and Resilience] of Engineering Systems:  
Synthesis and Applications  
(9<sup>th</sup> - 13<sup>th</sup> October, 2017)

[Under Global Initiative on Academic Network (GIAN) - An initiative of the Ministry of Human  
Resource Development, Government of India]

Registration Form

To be submitted not later than 15<sup>th</sup> September, 2017

Personal Information

Name \* \_\_\_\_\_

Qualification \* \_\_\_\_\_

Occupation \* \_\_\_\_\_

Organization/Institution/University \* \_\_\_\_\_

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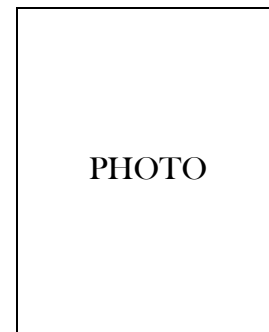
Teaching/Research Interest \* \_\_\_\_\_

Address/City \* \_\_\_\_\_

\_\_\_\_\_

Country \* \_\_\_\_\_

Email & Contact No. \* \_\_\_\_\_



Registration Fee Details \* (please tick):

- Participants from abroad: US \$500
- Industry/Research Organizations: Rs. 10,000/-
- Faculty from Academic Institutions: Rs. 2,000/-
- Students from Academic Institutions: Rs. 1,000/-

Payment Details\* (Payment may be made through Demand Draft/Cheque in favour of "Registrar, DCRUST, Murthal" payable at Murthal.)

DD/Cheque/ TR. No. \_\_\_\_\_ Amount: \_\_\_\_\_ Bank: \_\_\_\_\_ Date: \_\_\_\_\_

Signature with Date \*

\*Required fields

HOW TO APPLY:

1. Registration form should accompany DD/Cheque of respective registration fees (non-refundable) as applicable, or fund Transfer through NEFT/RTGS in the following Bank, Details:  
A/c Name: Registrar, DCRUST, Murthal A/C No. 30322539975  
Bank Name: SBI Branch: DCRUST, Murthal IFSC: SBIN0014374 MICR: 110002358
2. Scanned copy of duly filled up registration form with demand draft/cheque/NEFT/RTGS proof must be emailed to the coordinator to [drkgarg.me@dcrustm.org](mailto:drkgarg.me@dcrustm.org) or [chairmanme@dcrustm.org](mailto:chairmanme@dcrustm.org)
3. The brochure and the registration form may be downloaded from the University website [www.dcrustm.ac.in](http://www.dcrustm.ac.in). or [www.dcrustm.org](http://www.dcrustm.org)

IMPORTANT INFORMATION:

1. Participants will be provided registration kit & course material covering the entire course.
2. After successful completion of the course, all participants will get participation certificates.
3. **No TA, DA will be provided to the participants.**
4. Accommodation may be provided to the participants on payment basis.
5. List of selected participants will be available on institute website.