

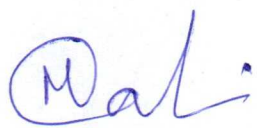


KG REDDY
College of Engineering
& Technology

**Certificate Course in Humanities and Science
with Specialization in
“Applications of Mathematics in Engineering”
Held On
05 February to 10 February 2018**



**Department of Humanities and Science,
KG Reddy College of Engineering & Technology**
Chilkur(Village), Moinabad(Mandal), Hyderabad RR Dist-501504


Coordinator


Principal
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KG Reddy College of Engineering & Technology
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SUMMARY REPORT OF APPLICATIONS OF MATHEMATICS IN ENGINEERING

About Course

The certificate course on application of mathematics in engineering is concluded its work successfully by department of Humanities and Science (H&S) in KG Reddy college of Engineering and technology (KGR CET), Hyderabad, Telangana. This course is a forum to bring together students to discuss innovative ideas and diverse topics of this course on next generation of information technologies. Department has taken a new step for students to improve the quality of study through this course and become most wide scale , extensive, spectacular event in Humanities and Science. The six days course was held in two locations of the department (a) Department E-learning room and (b) Department class.

The problems come from various applications, such as physical and biological sciences, engineering, and social sciences. Their solutions require knowledge of various branches of mathematics, such as analysis, differential equations, and stochastic, utilizing analytical and numerical methods.

Most require calculus, Differential Equations, Linear Algebra, Statistics and many other math areas. If you are talking about what engineers use on a daily basis, well pretty much all of engineering is dealing with physics and at the root of physics is mathematics.

Applied mathematics is the application of mathematical methods by different fields such as science, engineering, business, computer science, and industry. Thus, applied mathematics is a combination of mathematical science and specialized knowledge.

This course is absolutely practical oriented course which is helped to student for making their carrier through database in any industry. The students of 1st year 2nd semester have been benefited in many ways from this course. More than 80 students have joined in this course as their own interest and completed this course. The trainer taught to students very nice with real time example and sharing his knowledge to develop technical skill in industry.

Objectives of the course

The objective of the course is to bring together experts from academic institute and training institute for sharing of knowledge, expertise and experience in emerging trends related to the computer science and engineering topics.

The goal of this applied mathematics course is to provide engineering students and college freshmen an introduction to basic mathematics and especially show how mathematics is applied to solve fundamental engineering problems. The aim of the course is to show the students why mathematics is important in an engineering career by demonstrating how simple engineering problems can be mathematically described and methodically analyzed to find a solution.

The Applied Mathematics aims at providing high-level competences for the formalization and the consequent mathematical analysis of problems arising from applied sciences and technologies, with a special focus on the analysis of big data systems and complex systems.

The program provides courses which complete the basic mathematical competences, covering all the main areas of Mathematics (Mathematical Logic, Algebra, Geometry, Mathematical Analysis, Mathematical Physics, Statistics, Numerical Analysis, Optimizations, Foundations of Mathematics). Then, the student has a choice of courses focused in areas where the support of advanced mathematical methods is fundamental in recent scientific researches and developing technologies. These courses cover topics such as the theory of

formal languages, discrete methods in Mathematics, the applications of data analysis, bioinformatics and information systems for understanding structures in big data systems and networks, the techniques for modeling, analyzing and simulating complex dynamic systems, discrete event systems and nonlinear control systems. The student is trained to the interaction with specialists working in the scientific and technological areas where the support of advanced mathematical tools is required. The acquired skills include the ability of retrieving methodological information from the advanced mathematical literature. Students interested in Education can complete the program with courses focused in the foundational and educational aspects of Mathematics.

As a result many keynote, tutorial and technical sessions have been prepared in accordance with course scope to discuss the challenges, opportunities and problems of application of computer science engineering in various fields.

Scope of the Course

The scope of mathematics and statistics has no boundaries. In fact, you can do just about anything you want to do. Some of the career opportunities available to a major in mathematics or statistics include:

Analysts:

Statistics and mathematics graduates have an immense scope of becoming analysts and that too in various domains. Some of the prominent domains include:

1. Research Analyst
2. Regional Analyst
3. National Analyst
4. Housing Analyst
5. Intelligence Analyst
6. Regional Intelligence Analyst
7. Operations Research:

The subject matter in this area, to a great extent is concerned with determining the optimal ways of doing things based on some mathematical model of a situation. Major mathematical tools that enter operations research are:

1. Calculus
2. Linear algebra
3. Probability
4. Statistics
5. Graph theory
6. Combinatorics
7. Computer Science
8. Actuarial Science:

This is the latest budding vocation for mathematicians. Actuaries are specialized mathematicians predominantly working for insurance companies. Actuarial science essentially deals with the education of insurance risks and Financial Management of Insurance Companies. It involves the application of mathematical and statistical analysis to a wide range of decision-making process in insurance, investment, financial planning and management. It's another branch is casual actuaries and is meant for those interested in property and liability insurance. In recent years, employment in this specialty has benefited from the considerable diversification that has occurred in terms of the number of fields in

which actuaries work. This has occurred both within their traditional fields, meaning insurance and pension plans, and in the emergence of new market niches.

Biostatistics, Biomathematics and Epidemiology:

Statistics has got wide applications in health sciences as well. Epidemiologists scrutinize the spread of diseases and model how to respond to epidemics. Biomathematics is chiefly concerned with the application of mathematics in health sciences. It is in fact the next big trend within mathematics. Biomathematics includes bioinformatics, a sort of cs/math/biology hybrid field.

Statistician:

There lies immense scope for economics or mathematics statistician. As the need of information is increasing day by day, the demand of statisticians is also increasing. Various responsibilities of a statistician include:

Developing newer methods to analyze the information

The course contains both theory and practical for applications as well as design methods based on big data related topics. The list of topics spans all the areas of the big data using Hadoop and engineering domains. It covered significant recent developments in the field, both of a foundational and applicable character of this course. An important feature of this course is very useful in service carrier. The selected topics of this course helped to make project work. This permits also a rapid and broad dissemination of project and research work.

OUTPUT:

This course was not only shared the knowledge among students but also tied up with expert for upcoming course.

Learning Outcomes: Upon completion of this course, students should be able to:

1. Compute a given integral using the most efficient method;
2. Use integrals to formulate and solve application problems in science and engineering;
3. Construct and plot parametric and polar curves;
4. Identify different types of series and determine whether a a particular series converges;
5. Find the interval of convergence of a power series;
6. Apply Taylor series to approximate functions and estimate the error of approximation.

Applied Mathematics Program Learning Outcomes:

This course is aligned with the following Applied Mathematics program learning outcomes:

1. Solve mathematical problems using analytical methods.
3. Recognize the relationships between different areas of mathematics and the connections between mathematics and other disciplines.
4. Give clear and organized written and verbal explanations of mathematical ideas to a variety of audiences.

Summary of Participants

- (a) Number of students attended this course:
- (b) Number of student attend the exam:
- (c) Number of certificate issued:

Day-1
(05-02-18)

Time: 09:00 AM to 11:00 AM

Inauguration of certificate course

The first day of certificate course started with welcoming and opening ceremony at the KGR CET conference Hall. The following dignitaries were representatives of the certificate course who were addressed and pointed out the importance on course with short welcoming speeches.

Welcome addressed by Mr. Mahesh Reddy, HOD, H&S, KGR CET
About the certificate course by Principal Dr. R. S. Jahagirdar, KGR CET.
Importance of this course by expert trainer Mr. Dr. D Chenna Kesavaiah, Hyderabad
Interaction with 1st year 2nd semester students

Time: 11:10 AM to 04:15 PM

Different mathematical fundamentals explained briefly such as

- (a) Probability and Statistics: Random Variables, Mean and Variance, Binomial and Poisson Distributions, Gaussian Distribution, Other Distributions, The Central Limit Theorem, Weibull Distribution
- (b) Regression and Curve Fitting: Sample Mean and Variance, Method of Least Squares, Correlation Coefficient, Linearization, Generalized Linear Regression and Hypothesis Testing
- (c) Numerical Methods: Finding Roots, Bisection Method, Newton-Raphson Method, Numerical Integration, Numerical Solutions of ODEs
- (d) Computational Linear Algebra: System of Linear Equations, Gauss Elimination, LU Factorization, Iteration Methods, Newton-Raphson Method, Conjugate Gradient Method
- (e) Linear Programming: Linear Programming, Simplex Method, A Worked Example
- (f) Optimization: Optimization, Optimality Criteria, Unconstrained Optimization, Gradient-Based Methods, Nonlinear Optimization, Karush-Kuhn-Tucker Conditions
- (g) Partial Differential Equations: First-Order PDEs, Classification of Second-Order PDEs, Classic Mathematical Models: Some Examples , Solution Techniques

Static analysis of a 3-bar truss structure

Truss structures are commonly used in structural engineering and architecture due to their superior stiffness and strength for a given amount of material. A truss structure that consists of straight members connected by means of pin joints, and supported at both ends by means of hinged joints or rollers, such that they cannot transfer moments, is described as being statically determinate. Thus, loading subjected to a truss structure results in either tensile or compressive forces in the members, together with reaction forces at the supports. The static equilibrium equations express the fact that the sum of the x- and y-components of the forces at each of the three joints must be equal to zero.