हिमाचल प्रदेश केंद्रीय विश्वविद्यालय

Central University of Himachal Pradesh

(Established under Central Universities Act 2009)

शाहपुर परिसर, शाहपुर, ज़िला काँगड़ा (हि.प्र.) - 176206

Shahpur Parisar, Shahpur, Distt. Kangra (HP) - 176206

Website: www.cuhimachal.ac.in

University wide Interdisciplinary Courses (02) Credits for Course Basket

Course Code: IAM 403
Course Name: Numerical Analysis
Credits: 02
Course Instructor: Prof. Rakesh Kumar

Credits Equivalent: (One credit is equivalent to 10 hours of lectures/organized classroom activity / contact hours; 5 hours of laboratory work / practical / field work /Tutorial / teacher-led activity and 15 hours of other workload such as independent individual/ group work; obligatory/ optional work placement; literature survey/ library work; data collection/ field work; writing of papers/ projects/ dissertation/thesis; seminars, etc.)

Course Objective: The main objective of this course is to familiarize the students with basic numerical schemes and their applications.

Course Outcomes: After completing the course satisfactorily, the student will be able to:

CO1: Interpolate and approximate functions.
CO2: Perform numerical differential and integration.
CO3: Perform error analysis.
CO4: Apply basic numerical algorithms.
Attendance Requirements:

Students are expected to attend all lectures in order to be able to fully benefit from the course. A minimum of 75% attendance is a must failing which a student may not be permitted to appear in examination.

Evaluation Criteria:

1. Mid Term Examination: 20
2. End Term Examination: 40
3. Continuous Internal Assessment: 20

Course Contents:

Unit I: Lagrange and Newton interpolations, interpolations using finite differences, Hermite interpolation, piecewise and spline interpolation, Polynomial approximation: least square approximation, orthogonal polynomials, uniform approximation, rational approximation. **(07 HRS)**

Practicum

- Solving the Exercises of the selected Chapters
- Implementation on the selected real world problems
- Performing simulations for the pattern of solutions

Unit II: Numerical Differentiation and Integration: methods based on interpolation, methods based on undetermined coefficients, composite integration methods, Romberg integration. **(07 HRS)**

Practicum

- Solving the Exercises of the selected Chapters
- Implementation on the selected real world problems
- Performing simulations for the pattern of solutions

Unit III: Initial and Boundary value problems: Taylor's series method, Runge-Kutta methods, shooting method. **(06 HRS)**

Practicum

- Solving the Exercises of the selected Chapters
- Implementation on the selected real world problems
- Performing simulations for the pattern of solutions

General Practicum:

i. Classroom Presentation
ii. Model/Chart/PowerPoint based presentations
iii. Assignment/ Write Up/Creative work
iv. Books/Journals Readings
v. Tutorials/PBL

Prescribed Text Book:

1. M.K. Jain, S. R. K. Iyengar and R. K. Jain: Numerical Methods, 6th Edition, New Age International (P) Limited, Publishers, New Delhi.

Suggested Additional Readings:

1. S. S. Sastri; Introductory Methods of Numerical Analysis, PHI Learning Pvt. Ltd., 2005.
2. S.C. Chapra: Applied Numerical Methods with MATLAB, McGraw Hill, 2012.

Course Articulation Matrix of IAM 403- Numerical Analysis

Course Outcomes	Programme Specific Outcomes 1	ProgrammeSpecific Outcomes 2	Programme Outcomes 1	Programme Outcomes 2	Programme Outcomes 3	Programme Outcomes 4
CO1	3	2	2	3	2	1
CO2	3	2	2	3	2	1
CO3	3	3	3	2	2	2
CO4	2	3	3	2	1	1

1. Partially Related
2. Moderately Relate
3. Highly Related