

Indian Institute of Technology Kanpur
Department of Mathematics & Statistics
Proposal for New Elective Course

Title: Iso-geometric Analysis
 Course No: MTH 6XX
 Credits: 3-0-0-9 (L-T-P-C)
 Semester: Any
 Department: Mathematics & Statistics
 Proposer: B.V.R.Kumar
 Prerequisite: MTH-308, MTH-430, MTH-421, MTH 522
 No. of Students: ~ 25
 Dept. to which course may be interesting: MATH/PHY/All Engineering Dept.

Course Objective: Iso-geometric methods are increasingly getting popular and have been successful in handling several scientific and engineering problems with complex domains. They are known for their capability in precisely denoting the complex geometries. These methods are found to be competitive accurate and efficient for solving differential equations. Course aims to introduce these recent state of art trends to our students for solving DEs governing scientific phenomenon in complex domain in an accurate way .

Course Content:

S.No.	Item	No. of Lectures
1	Introduction – ✓ Need for IGA, ✓ Computational geometry, ✓ FEA Basis, ✓ CAD	2
2	NURBS – ✓ B-splines ✓ Non-Uniform Rational B-Splines ✓ 2.3 Multiple patches ✓ Generating a NURBS mesh	4
3	NURBS as a Basis for Analysis: Linear Problems ✓ The isoparametric concept ✓ Boundary value problems (BVPs) ✓ Numerical methods ✓ Boundary conditions ✓ Multiple patches revisited ✓ Comparing isogeometric analysis with classical finite element analysis	9
4	Linear Elasticity	4
5	Time Dependent Problems	5
6	Non-Linear Iso-geometric Analysis	5
7	Fluids	4
8	Fluid structure Interaction	3
9	Higher Order PDEs	4
10	Additional Geometrical Frameworks	2

Reference Books:

- J. Austrin Cotrell et al., Iso-geometric Analysis 2009, Wiley
- Annalis Bufa et al., Iso-Geometric Analysis for PDEs, 2011, Springer

Date: 25.09.24

Signature of the Proposer:

B. V. R. Kumar

Signature of DPGC Convener: Course

Approved/Not Approved

Signature of Chairman SUGC