| **Code:MAT5391: Computational Lab**<br>Prerequisites: Basics in Computer programming | L | T | P | Credit |
|---|---|---|---|---|
| | 1 | 0 | 2 | 2 |

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| Course Category | Core |
| Course Type | Theory and Practical |
| Course Objective | Reinforce a structured, top-down approach to formulate and solve problems. 2. Introduce common approaches, structures, and conventions for creating and evaluating computer programs, primarily in a procedural paradigm, but with a brief introduction to object-oriented concepts and terminology. 3. Apply a variety of common numeric techniques to solve and visualize engineering-related computational problems. 4. Introduce the MATLAB software environment. |
| Course Outcome(s) | Provide students with the background and skills required to numerically simulate and solve problems of approximations and optimizations. This will be a hands-on class with theory accompanied by practical implementation in MATLAB. After a review of programming in MATLAB and basic numerical methods (linear equations, interpolation, numerical differentiation, integration), methods to solve various ordinary and partial differential equations will be covered. |

**Syllabus:**

Introduction to basic operators, Functions and Predefined Variables, Defining Variables. Matrices, Matrix Operations. Plotting Graphs - Two-Dimensional Plots - Three-Dimensional Plot., General Commands, Polynomials, Curve Fitting and Interpolation -programming exercise (Numerical Methods) including development of algorithms to solve ordinary differential equations and partial differential equations. Using which Programming you will be taught for this.

The program coding executed using C or C++ programming languages are preferred.
However, codes may also use software programs including Matlab/Octave, Mathematica.

LATEX - Introduction, Document preparation - Basic.

**References:**


1. J. Stoer and R. Bulirsch, Introduction to Numerical Analysis, Springer-Verlag, ISBN 0-387- 90420-4.
2. A. Quarteroni, F. Saleri and P. Gervasio, Scientific Computing with MATLAB and Octave, Springer, Science & Business Media, 2010.


| **MAT 5490: Dissertation**<br>Prerequisites: Reasonably good understanding about M.Sc. first year courses; especially those related to the project topic | L | T | *PD | Credit |
|---|---|---|---|---|
| | 0 | 0 | 18 | 6 |

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| Course Category | Core |
| Course Type | Theory |
| Course Objective | To provide training in scientific skills ; To prepare students for professional training programme or entry level jobs in any area of Mathematics |