

Name of the Department/Centre: Computer Science

Course Type (Please tick the appropriate box):

| | | | | | |
|-------------|--------------------------|--------------------------|-------------------------------------|---------------------|--------------------------|
| Major | <input type="checkbox"/> | Discipline Specific Core | <input type="checkbox"/> | Ability Enhancement | <input type="checkbox"/> |
| Minor | <input type="checkbox"/> | Multidisciplinary | <input checked="" type="checkbox"/> | Skill Enhancement | <input type="checkbox"/> |
| Value Added | <input type="checkbox"/> | Any other | <input type="checkbox"/> | | <input type="checkbox"/> |

Course Title: Digital Empowerment

Semester: I

Total Credits: 3 Lecture-Tutorial-Practical (LTP) :(3-0-0)

Maximum Marks: 100 No of seats:50

Course Advisor Name: NA

Course Advisor's Email: computerscience@jmi.ac.in

Prerequisites: Nil

Special Requirements (if any): Nil

Expected Learning Outcomes:

- Understand the basics of digital literacy and the role of technology in modern society.
- Develop skills in using digital tools for communication, collaboration, and content creation.
- Explore the ethical and societal implications of digital technologies.
- Gain practical knowledge in cybersecurity and online privacy.
- Learn how to use digital technologies for social and professional empowerment.

Course Syllabus (Unit wise):

1. **Digital literacy:** vision of Digital India: DigiYatra, e-Aadhaar, DigiLocker, e-Hospitals, e-Pathshala, e-Kranti (Electronic Delivery of Services), e-Health Campaigns; Public utility portals of Govt. of India such as RTI, Health, Finance, Income Tax filing, etc; Educational portals, SWAYAM, Virtual Labs, National Digital Library of India (NDLI), JMI e-Library, UPI BHIM, etc.
2. **Digital Communication:** Online Communication Skills, emails, instant messaging, and social media, Digital etiquette and netiquette, Tools for online collaboration (Google Workspace, Microsoft Teams, Slack, Virtual teamwork and project management; Digital Content Creation: tools (Canva, Adobe Spark), Writing and blogging for the web.
3. **Digital Technologies and Society:** Digital inclusion and the digital divide, cultural considerations; role of technology in education, healthcare, and governance, digital activism and social change, digital empowerment for personal and professional Growth, building a digital portfolio and online presence, Legal and Regulatory Frameworks: key laws and regulations affecting computing (e.g., GDPR, DMCA).
4. **Digital Ethics and responsibility:** ethical issues in AI, and autonomous systems; Responsibility and accountability in autonomous decision-making; Case studies: Ethical dilemmas in autonomous vehicles and AI-driven healthcare; social media platforms ethics: Issues of misinformation, online harassment, and digital addiction, Case studies: The ethical responsibility of social media companies; Global Impact and Ethical Leadership in technology; Intellectual property rights and software licensing, etc.

Text Book:

- Ajay Dutta, Omika: "Digital Empowerment: Digital Transformation: Empowering People for Success", ISBN B0C79QR7XG

References Books:

- Sara Baase and Timothy M. Henry: "A Gift of Fire: Social, Legal, and Ethical Issues for Computing Technology"
- Dale & Lewis: Computer Science Illuminated, Narosa.
- Tamilselvan P, Ramnath R, Mahendraprabu M: Digital Ethics, 2020, Scholars' Press

Name of the Department/Centre: Computer Science

Course Type (Please tick the appropriate box):

| | | | | | |
|-------------|--------------------------|--------------------------|--------------------------|---------------------|-------------------------------------|
| Major | <input type="checkbox"/> | Discipline Specific Core | <input type="checkbox"/> | Ability Enhancement | <input type="checkbox"/> |
| Minor | <input type="checkbox"/> | Multidisciplinary | <input type="checkbox"/> | Skill Enhancement | <input checked="" type="checkbox"/> |
| Value Added | <input type="checkbox"/> | Any other | <input type="checkbox"/> | | <input type="checkbox"/> |

Course Title: Algorithmic Computation

Semester: I

Total Credits: 3 **Lecture-Tutorial-Practicals (LTP):** (2-0-2)

Maximum Marks: 100 **No of seats:** 50

Course Advisor Name: NA

Course Advisor's Email: computerscience@jmi.ac.in

Prerequisites: Nil

Special Requirements (if any): Nil

Expected Learning Outcomes:

- Produce computational models and illustrate algorithmic terminology.
- Create algorithms and flowcharts for fundamental computational issues that are iterative or recursive.
- Create factoring algorithms, evaluate them, and create superior versions of them.
- Put array-based searching and sorting algorithms into practice and evaluate them.
- Create elegant algorithms, then analyze, trace and test them.
- Possess the requisite knowledge of personal computing.

Course Syllabus (Unit wise):

1. **Algorithmic Problem Solving:** Algorithms; Problem-Solving Aspect: Algorithm Devising, Design and Top-down Design; Algorithm Implementation: Essential and Desirable Features of an Algorithm; Efficiency of an Algorithm, Analysis of Algorithms, Pseudocodes and Flowcharts; Algorithm Efficiency, Analysis and Order; Importance of Developing Efficient Algorithms; Complexity Analysis of Algorithms: Every-Case Time Complexity, Worst-Case Time Complexity, Average-Case Time Complexity, Best-Case Time Complexity, Introduction and Implementing algorithms in excel.
2. **Basic Algorithms:** Exchanging the Values of Two Variables, Counting, Summation of a Set of Numbers, Factorial Computation, Sine Function Computation, Generation of the Fibonacci Sequence, Reversing the Digits of an Integer, Base Conversion, etc., Recursive Algorithms.
3. **Factoring:** Finding the square root of a number, Smallest Divisor of an integer, Greatest common divisor of two integers, generating prime numbers, computing prime factors of an integer, Generation of pseudo-random numbers, Raising a number to a large power, Computing the *n*th Fibonacci number.
4. **Arrays, Searching and Sorting:** Single and Multidimensional Arrays, Array Order Reversal, Array counting, Finding the maximum/minimum number in a list, Efficient algorithm for finding max-min in a list, partitioning an array, Monotones Subsequence; Searching: Linear and Binary Array Search, interpolation search; Sorting: Sorting by selection, Exchange and Insertion.

Text Book:

- R.G. Dromy: How to Solve by Computer. Pearson

References Books:

- L.A. Robertson: Simple Program Design, A Step-by-Step Approach. Thomson
- Ed Bott and Carl Siechert: Microsoft Office Inside Out 2013 Edition, Microsoft e-Book
- Implementing Algorithms in Excel: A Step-by-Step Guide: <https://local.host/how-to-put-algorithm-in-excel/>

LAB Component (Generic Assignments Set on Algorithmic implementation with MS Excel)

1. Adding new data, editing, copying and changing column widths for customer service data
2. Calculate parking fees using an IF function.
3. Using MATCH and INDEX to look up flight times by destination and weekday.
4. Create an Excel table of rollercoasters and sort the data.
5. Preparing the balance sheet of a company
6. SmartArt and Drawings, Templates, Comments and Hyperlinks
7. Preparing a salary calculator for the company and Auditing
8. Creating scenarios for different input changes for an investment model.
9. Calculating conditional counts and sums of data using Excel functions for sales data.
10. Creating a query to import a table of tall buildings, create new columns and then pivot the data.