

Savitribai Phule Pune University, Pune

Faculty of Commerce and Management

Master of Computer Applications (MCA)

Programme Curriculum (Sem. I & II) (2020-2022)

Preamble:

1. The name of the programme shall be Masters of Computer Applications (M.C.A)
2. The revised MCA Curriculum 2020 builds on the implementation of the Choice Based Credit System (CBCS) and Grading System initiated in the AY 2015. The curriculum takes the MCA programme to the next level in terms of implementing Outcome Based Education along with the Choice Based Credit System (CBCS) and Grading System.
3. The Institutes should organize placement programme for M.C.A. students by interacting with Industries and software consultancy.
4. At the end of each semester, appearing for various certifications is possible for each student enabling them to make their resume rich.
5. With the rapidly changing scenario industry and academia should identify possible areas of collaboration and work together. Institute's placement cell should focus on identifying industrial expectations and institutional preparation for meeting industrial needs.

Introduction:

1. Definition: Outcome Based Education:

1.1 Outcome Based Education (OBE) Approach: Outcomes are about performance, and this implies:

- 1.1.1** There must be a performer – the student (learner), not only the teacher
- 1.1.2** There must be something performable (thus demonstrable or assessable) to perform
- 1.1.3** The focus is on the performance, not the activity or task to be performed

1.2 Programme Educational Objectives (PEOs): Programme educational objectives are broad statements that describe the career and professional accomplishments that the programme is preparing graduates to achieve. Programme Educational Objectives are a set of broad future focused learner's performance outcomes that explicitly identify what learners will be able to do with what they have learned, and what they will be like after they leave institution and are living full and productive lives. Thus, PEOs are what the programme is preparing graduates for in their career and professional life (to attain within a few years after graduation).

- 1.3 Programme Outcomes (POs):** Programme Outcomes are a set of narrow statements that describes what students (learners) of the programme are expected to know and be able to perform or attain by the time of graduation.
- 1.4 Course Outcomes (COs):** Course Outcomes are narrower statements that describe what students are expected to know and be able to do at the end of each course. These relate to the skills, knowledge, and behavior that students acquire in their matriculation through the course.
- 1.5 Learning Outcomes:** A learning outcome is what a student CAN DO because of a learning experience. It describes a specific task that he/she can perform at a given level of competence under a certain situation. The three broad types of learning outcomes are: a) Disciplinary knowledge and skills b) Generic skills c) Attitudes and values
- 1.6 Teaching and Learning Activities (TLAs):** The set of pedagogical tools and techniques or the teaching and learning activities that aim to help students to attain the intended learning outcomes and engage them in these learning activities through the teaching process.
- 1.7 Assessment and Evaluation:** Assessment is one or more processes, carried out by the institution, that identify, collect, and prepare data to evaluate the achievement of programme educational objectives and programme outcomes. Evaluation is one or more processes, done by the evaluation team, for interpreting the data and evidence accumulated through assessment practices. Evaluation
- 1.8** determines the extent to which programme educational objectives or programme outcomes are being achieved, and results in decisions and actions to improve the programme.

2. MCA Programme Focus:

The basic objective of the Master of Computer Applications (MCA) is to provide a steady stream of necessary knowledge, skills and foundation for acquiring a wide range of rewarding careers into rapidly expanding world of Information Technology

2.1 Programme Educational Objectives: PEOs are defined by institution. Following are the guidelines for defining PEOs

- 2.1.1** PEOs should be assessable and realistic within the context of the committed resources.
- 2.1.2** The PEOs should be consistent with the mission of the institution.
- 2.1.3** All the stakeholders should participate in the process of framing PEOs.
- 2.1.4** The number of PEOs should be manageable.
- 2.1.5** It should be based on the needs of the stakeholders.
- 2.1.6** It should be achievable by the programme.
- 2.1.7** It should be specific to the programme and not too broad.
- 2.1.8** It should not be too narrow and similar to the POs.

2.2 MCA Programme Outcomes (POs): At the end of the MCA programme the learner will possess the following Program Outcome:

PO1: Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.

PO2: Identify, formulate, research literature, and solve *complex* Computing problems reaching substantiated conclusions using fundamental principles of Mathematics, Computing sciences, and relevant domain disciplines.

PO3: Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

PO4: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

PO5: Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.

PO6: Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.

PO7: Recognize the need, and have the ability, to engage in independent learning for continual development as a Computing professional.

PO8: Demonstrate knowledge and understanding of computing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO9: Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.

PO10: Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.

PO11: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.

PO12: Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

3. Admission Details:

3.1 Eligibility for Admission: The eligibility criteria for admission for the MCA course will be as decided by the All Indian Council of Technical Education (AICTE), New Delhi and Directorate of Technical Education (DTE), Government of Maharashtra. It will be published on their respective websites time to time.

3.2 Reservation of Seat: The percentage of seat reserved for candidates belonging to backward classes only from Maharashtra State in all the Government Aided, Un-aided Institutions/Colleges and University Departments is as per the norms given by Government of Maharashtra, time to time.

3.3 Selection Basis: The selection would be done as per the guidelines given by the Director of Technical Education, Maharashtra State, time to time.

4. Lecture-Practical/Project-Tutorial (L-P-T)

A course shall have either or all the three components, i.e. a course may have only lecture component, or only practical/project component or a combination of any two/three components

4.1 Lecture(L): Classroom sessions delivered by faculty in an interactive mode. It should be conducted as per the scheme of lectures indicated in respective course.

4.2 Practical/Project(P): Practical / Project Work consisting of Hands-on experience /Field Studies / Case studies that equip students to acquire the much-required skill component. Besides separate Practical/Project course, three courses in each semester include few practical assignments and it will be evaluated under internal evaluation

4.3 Tutorial(T): Session consisting of participatory discussion/ self-study/ desk work/ brief seminar presentations by students and such other novel methods that make a student to absorb and assimilate more effectively the contents delivered in the Lecture sessions

4.4 A Mini project is an assignment that the student needs to complete at the end of every semester in order to strengthen the understanding of fundamentals through effective application of the courses learnt. The details guidelines have been given in the course structure.

4.5 The Project Work to be conducted in the FINAL Semester and evaluated at the end of the semester. The detail guidelines have been in the respective course structure.

4.6 The teaching / learning as well as evaluation are to be interpreted in a broader perspective as follows:

- i) Teaching – Learning Processes: Classroom sessions, Group Exercises, Seminars, Small Group Projects, Self-study, etc.
- ii) Evaluation: Tutorials, Class Tests, Presentations, Field work, Assignments, competency-based Activity, Research papers, Term papers, etc.

The MCA programme is a combination of:

- a. Three-Credit Courses (75 Marks each): 3 Credits each
- b. Two-Credit Courses (50 Marks each): 2 Credits each
- c. One-Credit Courses (25 Marks each) : 1 Credits each

Following are the session details per credit for each of L-P-T model

- 1) Every ONE-hour session per week of Lecture(L) amounts to 1 credit per semester,
- 2) Minimum of TWO hours per week of Practical(P) amounts to 1 credit per semester,
- 3) Minimum of ONE hours per week of Tutorial(T) amounts to 1 credit per semester

5. Open Courses (OC):

Institute has to offer two open courses of 1 credit each per semester to the students from Semester I to Semester III. The motive behind keeping an open course is to make students aware of current/upcoming trends in Information Technology and other domains. Full autonomy is given to the Institute to plan and execute the open courses. It is expected to extend the autonomy to the student

also. Care must be taken to consider credit points and necessary contact hours assigned to it while finalizing any open course for the given semester. In each semester total 2 credits are reserved for open courses.

Suggestive List of OPEN Courses

FOR SEMESTER I		FOR SEMESTER II		FOR SEMESTER III	
1	Data Privacy and Protection	1	Software Agent	1	Speech Recognition
2	Linux system administration	2	Aptitude building -1	2	Sentiment Analysis
3	social media listening	3	Basics of Tableau	3	R Programming
4	Research Methodology	4	Fraud detection	4	Gesture recognition
5	Applied Statistical Methods	5	Ruby Basics	5	Aptitude building-2
6	Digital Marketing	6	LaTeX	6	Digital Image processing
7	G-Suite	7	Big data Analytics	7	Network Security
8	Joomla	8	Game Programming in Unity	8	big data Technologies
9	e-trading	9	Block Chain Technology	9	AWS Fundamentals
10	Scratch and MIT App Inventor Programming	10	Business Intelligence - be specific	10	Edge Computing
11	Random Forest using MS Excel	11	Design Thinking & Problem-solving skills		
12	WordPress	12	Green Computing		
13	MS-OFFICE	13	IoT		
14	Code ignitor				

6. Extra Reading and Certification:

Each Chapter in the course is added with the extra reading part which gives extra pointer to gain In-depth knowledge apart from basic knowledge imparted in the syllabus. Learners should be encouraged to complete this extra reading portion as regular practice. Also, each course (Where ever applicable) includes suggested certification which help learners to enrich themselves as per industry demands and requirements.

7. Evaluation and Assessment:

In total 112 credits represent the workload of a year for MCA program.

Semester	Credit	IE	UE
Semester I	28	350	350
Semester II	28	350	350
Semester III	28	350	350
Semester IV	28	350	350
Total	112	1400	1400
			2800

The final total assessment of the candidate is made in terms of an internal (concurrent) evaluation and an external (university) examination for each course. In total the internal (concurrent) to external (university) marks ratio is maintained 50:50.

In general

- 1) For each course, 25 will be based on evaluation and 50 marks for semester end examination conducted by University, unless otherwise stated.
- 2) The internal evaluation of 25 marks further divided into Written Examination (Assignments/Unit test/written examination etc.), Practicals and Tutorials. The details have been specified in each course.
- 3) There will be one Practical course and one Mini Project course in each semester with 75 marks allotted for internal evaluation and 50 marks allotted for University examination. External assessment will be done by university appointed examiner. During external examination, examiner should ask the programs/practical ONLY from the work book of the students.
- 4) The internal marks will be communicated to the University at the end of each semester, but before the semester-end examinations. These marks will be considered for the declaration of the results.

Guidelines to conduct Mini-Project evaluation for Semester I, Semester II and Semester III of MCA – 2020 pattern

For Internal Evaluation

1. Internal evaluation will be of 75 Marks. It will be distributed as follows

Description	Marks
Project Report	35
Viva	15
Working Demo	25
Total	75

2. Project Report (including Project Diary) should be evaluated only during INTERNAL evaluation. Textual chapters should be given 10 marks while diagrams, test cases/validations, screen designs should be evaluated for 20 marks and 5 Marks should be given for Project Diary. Thus, totaling up to 35 marks.

For External Evaluation

1. Evaluation will be conducted by one Internal (Appointed by Institute) and one External examiner (Appointed by university).
2. External evaluation will be of 50 Marks. It will be distributed as follows

Description	Marks
Viva	15
Working Demo	35
Total	50

For Internal Evaluation and External Evaluation

1. VIVA should be conducted based on project domain and technologies used for developing the project. Every team member's individual contribution to the project may vary. Hence VIVA should be based on individual contribution pertaining to the project.
2. Working Demo is given maximum weightage to make sure that each group submits executable version of their project.
3. Examiners should evaluate efforts and contribution of every individual in the team (in case of group project).
4. Examiner may review code of the project while evaluating its working demo and modules.

Examination: Examinations shall be conducted at the end of the semester i.e. during November and in April/May. However supplementary examinations will also be held in November and April/May.

Concurrent Evaluation: A continuous assessment system in semester system (also known as internal assessment/comprehensive assessment) is spread through the duration of course and is done by the teacher teaching the course. The continuous assessment provides a feedback on teaching learning process. The feedback after being analyzed is passed on to the concerned student for implementation and subsequent improvement. As a part of concurrent evaluation, the learners shall be evaluated on a continuous basis by the Institute to ensure that student learning takes place in a graded manner. Concurrent evaluation components should be designed in such a way that the faculty can monitor the student learning & development and intervene wherever required. The faculty must share the outcome of each concurrent evaluation component with the students, soon after the evaluation, and guide the students for betterment. Individual faculty member shall have the flexibility to design the concurrent evaluation components in a manner so as to give a balanced assessment of student capabilities across Knowledge, Skills & Attitude (KSA) dimensions based on variety of assessment tools.

Suggested components for Concurrent Evaluation (CE) are:

1. Case Study / Situation Analysis – (Group Activity or Individual Activity)
2. Class Test
3. Open Book Test
4. Field Visit / Study tour and report of the same
5. Small Group Project & Internal Viva-Voce
6. Learning Diary
7. Scrap Book
8. Group Discussion
9. Role Play / Story Telling
10. Individual Term Paper / Thematic Presentation
11. Written Home Assignment
12. Industry Analysis – (Group Activity or Individual Activity)
13. Literature Review / Book Review
14. Model Development / Simulation Exercises – (Group Activity or Individual Activity)
15. In-depth Viva
16. Quiz

Institute can decide the type, method and frequency of Concurrent Evaluation for each course and execute accordingly. Detailed record of the Concurrent Evaluation shall be maintained by the Institute. The same shall be made available to the University, on demand.

8. Choice based Credit System (CBCS) and Grading:

The detail document about Choice based Credit System for PG Programme is available on university website. The Grading methodology is also available on university website. University reserves rights to revise CBCS and grading system time to time.

9. Medium of Instruction:

The medium of Instruction will be English.

10. Clarification of Syllabus:

It may be necessary to clarify certain points regarding the course. The BOS should meet to study and clarify any difficulties from the Institutes, as and when required.

11. Revision of Syllabus:

As the computer technology is changing very fast, revision of the syllabus should be considered every 2 years.

12. Attendance:

The student must meet the requirement of 75% attendance per semester per course for grant of the term. The Director shall have the right to withhold the student from appearing for examination of a specific course if the above requirement is not fulfilled. Since the emphasis is on continuous learning and concurrent evaluation, it is expected that the student's study all-round the semester. Therefore, there shall not be any preparatory leave before the University examinations.

13. ATKT Rules:

The ATKT rules mention in CBCS handbook (available on university website) is application to MCA Programme.

14. Maximum Duration for completion of the Programme:

The candidates shall complete the MCA Programme WITHIN 5 YEARS from the date of admission, by earning the requisite credits. The student will be finally declared as failed if she/he does not pass in all credits within a total period of four years. After that, such students will have to seek fresh admission as per the admission rules prevailing at that time.

15. Structure of the Programme and detail syllabus of each course:

Semester I					
Sr. No.	Course Title	Course Code	CP	EXT	INT
1	Java Programming	IT11	3	50	25
2	Data Structure and Algorithms	IT12	3	50	25
3	Object Oriented Software Engineering	IT13	3	50	25
4	Operating System Concepts	IT14	3	50	25
5	Network Technologies	IT15	3	50	25
6	Open Course 1	OC11	1		25
7	Open Course 2	OC12	1		25
* Practicals					
8	Practical	IT11L	5	50	75
9	Mini Project	ITC11	5	50	75
Soft Skills					
10	Soft Skills - I	SS11	1		25
			28	350	350

Semester II					
Sr. No.	Course Title	Course Code	CP	EXT	INT
1	Python Programming	IT21	3	50	25
2	Software Project Management	IT22	3	50	25
3	Optimization Techniques	MT21	3	50	25
4	Advanced Internet Technologies	IT23	3	50	25
5	Advanced DBMS	IT24	3	50	25
6	Open Course 3	OC21	1		25
7	Open Course 4	OC22	1		25
* Practicals					
8	Practical	IT21L	5	50	75
9	Mini Project	ITC21	5	50	75
Soft Skills					
10	Soft Skills - II	SS21	1		25
			28	350	350

Semester III					
Sr. No.	Course Title	Course Code	CP	EXT	INT
1	Mobile Application Development	IT31	3	50	25
2	Data Warehousing and Data Mining	IT32	3	50	25
3	Software Testing and Quality Assurance	IT33	3	50	25
4	Knowledge Representation & Artificial Intelligence - ML, DL	IT34	3	50	25
5	Cloud Computing	IT35	3	50	25
6	Open Course 5	OC31	1		25
7	Open Course 6	OC32	1		25
* Practicals					
8	Practical	IT31L	5	50	75
9	Mini Project	ITC31	5	50	75
Soft Skills					
10	Soft Skills- III	SS31	1		25
			28	350	350

Semester IV					
Sr. No.	Course Title	Course Code	CP	EXT	INT
1	DevOps	IT41	3	50	25
2	PPM and OB	BM41	3	50	25
2	Project	ITC41	22	250	300
			28	350	350

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Semester II	28	350	350
Semester III	28	350	350
Semester IV	28	350	350
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