2015-2018

MCA Syllabus

Faculty of Management

Savitribai Phule Pune University

Savitribai Phule Pune University

Syllabus for Masters of Computer Application

For Academic Year 2015-2018

MCA (Part I) From Academic Year 2015-2016
MCA (Part II) From Academic Year 2016-2017
MCA (Part III) From Academic Year 2017-2018

(I) Introduction:

1. The name of the programme shall be Masters of Computer Application (M.C.A)
2. The knowledge and skills required planning; designing to build Complex Application Software Systems. These are highly valued in all industry sectors including business, health, education and the arts. The basic objective of the education of the Masters programme in Computer Application (M.C.A) is to provide to the country a steady stream of the necessary knowledge, skills and foundation for acquiring a wide range of rewarding careers into the rapidly expanding world of the Information Technology.

3. The new Curricula would focus on learning aspect from four dimensions viz. Conceptual Learning, Skills Learning and Practical / Hands on with respect to four specialized tracks viz.
    1. Software and Application Development
    2. Infrastructure and Security Management
    3. Information Management & Quality Control
    4. Networking

4. The M.C.A. Programme will be a full-time three years Master's Degree Course of Computer Applications. In Second year the students will have to choose one of the four specialized tracks. The Institute should conduct sessions for the students to make them aware about the subjects, career prospects in the tracks. Making it easier for them to select one. Once a student selects a TRACK he/she is not allowed to change the track. Thus it is important for the Institute to guide the students for selecting the track.

5. The need for Specialization / Specialized tracks
    - The curriculum is designed to cater to the challenging opportunities being faced in Information Technology.
    - The specialization approach would help students to develop basic and advanced skills in areas of their interest thereby increasing their level of expertise. This would further promote the Masters programme in focused areas and result in development of expert skills as per the demands of career opportunities.
    - The specialization approach may in future be open to more areas of specialization and hence make this programme successful in academia as well as in Industry.
    - The first year of the specialized course has taken into consideration all fundamental areas and aspects of technical and management training required for this programme. A good mix of computer related courses use microcomputers to introduce standard techniques of programming; the use of software packages such as databases and programming languages for developing applications; system analysis and design tools. The general

business courses include the functional areas of management like information systems and decision support systems and engineering aspects of software development.

6. The Job Opportunities are
   - Many graduates begin their career at a junior level but are not in a position to map their job with expert technical skills obtained from a usual programme. The specialized programme would enhance their exposure to variety of roles and responsibilities they can take up in any areas of expertise. For e.g.: In the area of software development they could take up responsibilities in areas of database, product development, product maintenance and support in addition to management activities.
   - Focused grooming would also make it easier for the IT industry to decide which graduate could be mapped to the right domain.
   - Enabling entrepreneurship is also the need of the hour and students interested to be on their own could leverage from the newly designed focused programme for entrepreneurs. It will build right platform for students to become successful Software professional. This would emphasize on domain knowledge of various areas.

7. The Institutes should organize placement programme for the M.C.A students, by interacting with the industries and software consultancy houses in and around the region in which the educational Institution is located.

8. At the end of the syllabus various certifications possible for each semester. Students should try to do maximum Certifications in their learning phase only to make their resume rich.

9. Ordinarily, in each class, not more than 60 students will be admitted.

(II)

(A) Eligibility for Admission:

The eligibility criteria for admission for the MCA course will be as decided by the Competent Authority (Director, Technical Education-Government of Maharashtra, &/or AICTE, New Delhi)

1. A candidate who has either passed with minimum 50% of marks in the aggregate (45% in case of candidate who is domiciled in Maharashtra and belongs to the reserved categories i.e. S.C., S.T., D.T., N.T., O.B.C., S.B.C.)

OR

appeared at the final year examination of a post 10+2 course of minimum three years duration leading to an award of Bachelor's Degree, in any discipline by the Association of Indian Universities or has passed with minimum 45% of marks in the aggregate (45% in case of candidate who is domiciled in Maharashtra and belongs to the reserved categories) or appeared at an examination considered equivalent there to would be treated as eligible for Common Entrance Test (CET). Also the candidate must have passed mathematics/Business Mathematics & Statistics paper for 10+2 or graduation Level

AND

Passed the CET conducted by Director of Technical Education, Maharashtra State, with **non-zero score** for that year or passed the CET conducted by state level MCA Association with non-zero score for that year, or passed the AIMCET exam for that year.

2. However, a candidate would not be treated as eligible for admission to the MCA programme unless he/she passes his/her qualifying examination with requisite percentage on or before 30th September of the concerned academic year and also passes in the CET.

(B) 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 given below:

a)	Scheduled caste and Scheduled caste convert to Buddhism		13.0%
b)	Scheduled Tribes including those living outside specified areas	10.5%	
c)	Vimukta Jati		(14 as specified)
d)	Nomadic Tribes (NT1)(28 before 1990 as specified)		2.5%
e)	Nomadic Tribes (NT2)(Dhangar as specified)		2.5%
f)	Nomadic Tribes (NT3)(Vanjari as specified)		2.5%
g)	Other Backward Class		19.0%
	Total		**50.0%**

1. Candidate claiming to belong to categories mentioned against (e),(f) and (g) above will have to furnish certificate from appropriate authority that the candidate's parents do not belong to Creamy Layer as per the relevant orders of the Government.
2. If any of the (a) to (g) categories mentioned above does not get the required number of candidates for the percentage laid down in a University area, the seats so remaining vacant shall be filled in from among the candidates of remaining reserved categories with reference to the inter-se-merit of all candidates belonging to the reserved categories from the same University area. However, the total reservation shall not exceed 50%. After doing so the seats remaining vacant shall be filled in with reference to inter-se-merit of all the candidates from the same University area.

(C) Selection Basis:

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

(III) Number of Lectures and Practical:

Lectures and Practical should be conducted as per the scheme of lectures and practical indicated in the course structure where one session is of 1 hr 30 min, though it is up to the individual Institute to decide the time for one session while designing the time table.

Practical Training and Project Work:

At the end of the sixth semester of study, a student will be examined in the course" Project Work".

1. The Major Project work will be started in Semester V. It may be done individually or in groups in case of bigger projects. However if project is done in groups, each student must be given a responsibility for a distinct module and care should be taken to see the progress of individual modules is independent of others.
2. Students should take guidance from an internal guide and prepare a Project Report on "Project Work" back to back print (one copy) which is to be submitted to the Director of the Institute. Wherever possible, a separate file containing source-code listings should also be submitted. Every student should also submit soft copy of their project synopsis. Their respective Institutes should forward the copy of this synopsis to the external panel members, in advance of the project viva dates if asked for.
3. The Project Synopsis should contain an Introduction to Project, which should clearly explain the project scope in detail. Also, Data Dictionary, ERDs, File designs and a list of output reports should be included if required as per the project title and scope.
4. The project Work should be of such a nature that it could prove useful or be relevant from the commercial/management angle.
5. The project report will be duly accessed by the internal guide of the subject and marks will be communicated by the Director to the University along with the marks of the internal credit for theory and practical to be communicated for all other courses.
6. The project report should be prepared in a format prescribed by the University, which also specifies the contents and methods of presentation.
7. The major project work carry 250 marks for internal assessment and 250 marks for external viva. The external viva shall be conducted by a minimum of one external examiner. The mini project work would be departmental.
8. Project work can be carried out in the Institute or outside with prior permission of the Institute.
9. Project viva-voce by the University panel will be conducted in the month of April-May.

(IV) Choice Based Credit System

Choice Based Credit System (CBCS) offers wide ranging choice for students to opt for courses based on their aptitude and their career goals. CBCS works on the fundamental premise that students are mature individuals, capable of making their own decisions.

CBCS enables a student to obtain a degree by accumulating required number of credits prescribed for that degree. The number of credits earned by the student reflects the knowledge or skills acquired by him / her. Each course is assigned a fixed number of credits based on the contents to be learned & the expected effort of the student. The grade points earned for each course reflects the student's proficiency in that course. CBCS is a process of evolution of educational reforms that would yield the result in subsequent years and after a few cycles of its implementation.

A. Key features of CBCS:

1. **Enriching Learning Environment:** A student is provided with an academically rich, highly flexible learning system blended with abundant provision for skill development and a practical orientation that he/she could imbibe without sacrificing his/her creativity. There is a definite movement away from the traditional lectures and written examination.

2. **Continuous Learning & Student Centric Concurrent Evaluation:** CBCS makes the learning process continuous. Likewise the evaluation process is not only made continuous but also made learner-centric. The evaluation is designed to recognize the capability and talent of a student.

3. **Active Student-Teacher Participation:** CBCS leads to quality education with active teacher student participation. This provides avenues to meet student's scholastic needs and aspirations.

4. **Industry Institute Collaboration:** CBCS provides opportunities for meaningful collaboration with industry and foreign partners to foster innovation, by introduction of electives and half credit courses through the cafeteria approach. This will go a long way in capacity building of students and faculty.

5. **Interdisciplinary Curriculum:** Cutting edge developments generally occur at the interface of two or more discipline. The interdisciplinary approach enables integration of concepts, theories, techniques, and perspectives from two or more disciplines to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline.

6. **Employability Enhancement:** CBCS shall ensure that students enhance their skill/employability by taking up project work , entrepreneurship and vocational training

7. **Faculty Expertise:** CBCS shall give the Institutes the much needed flexibility to make best use of the available faculty expertise.

B. Pre-requisites for successful implementation of CBCS

The success of the CBCS also requires certain commitments from both the students and the teachers.

1. The student should be regular and punctual to his classes, studious in carrying out the assignments and should maintain consistency in his tempo of learning. He should make maximum use of the available library, internet and other facilities.

2. The teachers are expected to be alert and punctual and strictly adhere to the schedules of teaching, tests, seminars, evaluation and notification of results.

3. All teachers should notify the tentative schedule of teaching and tests of the entire semester, including the dates of tests, dates of score notification and all other schedules, which can be planned in advance.

4. The teachers are expected to adhere to unbiased and objective evaluation and marking of concurrent evaluation scores (internal examinations) which will not only maintain the confidence of the students, but, at the same time, ensure that merit is given due credit.

5. Transparency, objectivity and quality are the key factors that will sustain a good CBCS system.

6. At the post-graduate level, and in a professional programme, the syllabus is to be looked upon as the bare minimum requirement to be fulfilled and sufficient emphasis shall be laid on contemporary aspects, going beyond the syllabus.

C. Credits

Credit: The definition of 'credits' can be based on various parameters - such as the learning hours put in, learning outcomes and contact hours, the quantum of content/syllabus prescribed for the course.

Each course is assigned a certain credit, depending on the estimated effort put in by a student. When the student passes that course, he/she earns the credits associated with that course.

In the Credit system the emphasis is on the **hours put in by the learner and not on the workload of the teacher.** Each credit can be visualized as a combination of **three components viz. Lecture (L) + Tutorials (T) + Practice (Practical / Project Work) (P) i.e. LTP Pattern.**

The effort of the learner for each Credit Point may be considered to have two parts:

a) One part consisting of the hours actually spent in class room / practical / field work instructions and
b) The other part consisting of notional hours spent by the Learner in self-study, in the library, peer interactions, case study, writing of journals and assignments, projects etc. for the completion of that course.

Every course offered shall have three components associated with the teaching-learning process of the course, viz.

a) **Lecture (L):** Classroom sessions delivered by faculty in an ***interactive mode***
b) **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
c) **Practice (P):** Practice session /Practical / Project Work consisting of Hands-on experience / Field Studies / Case studies that equip students to acquire the much required ***skill component***.

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

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

In terms of credits, for a period of one semester of 15 weeks:

a) every ONE hour session per week of L amounts to 1 credit per semester
b) a minimum of TWO hours per week of T amounts to 1 credit per semester,
c) a minimum of TWO hours per week of P amounts to 1 credit per semester,

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

The total credits earned by a student at the end of the semester upon successfully completing a course are 'L + T + P'. The ***credit pattern*** of the course is indicated as L: T: P.

If a course is of 3 credits then the different credit distribution patterns in L: T: P format could be 3:0:0, 1:2:2, 2:0:2, 2:2:0, etc. The credits of a course cannot be greater than the number of hours (per week for 15 weeks) allotted to it.

Full Credit Course: A course with Weightage of 4 credits is considered as a full credit course.
Half Credit Course: A course with Weightage of 2 credits is considered as a half credit course.

The MCA programme is a combination of:

a) Full Credit Courses (100 Marks each) : 4 Credits each
b) Half Credit Courses (50 Marks each) : 2 Credits each

D. Adoption of Credit and Grading System

As per national policy and international practices, it is proposed to adopt the Credit and Grading System for the MCA programme w.e.f. AY 2013-14.

D-1 Rationale for adoption of the Credit and Grading System:

a) **Learner's Perspective**: The current practice of evaluation of student's performance at the end of a semester is flawed. The students are expected to express their understanding or mastery over the content included in their curriculum for a complete semester within a span of three hours and their efforts over the semesters are often completely ignored. It also promotes unhealthy practice of cramming before the examinations and focusing on marks rather than on learning.

b) **Evaluation Perspective**: The present system of evaluation does not permit the flexibility to deploy multiple techniques of assessment in a valid and reliable way. Moreover, the current practice of awarding numerical marks for reporting the performance of learners suffers from several drawbacks and is a source of a variety of errors. Further, the problem gets compounded due to the variations in the marks awarded in different subjects. **The 'raw score' obtained by the learner, is, therefore, not a reflection of his true ability.**

   In view of the above lacunae, it is desirable that the marking system used for the declaration of results is replaced by the grading system. The system of awarding grades provides a more realistic picture of learner's ability than the prevailing marking system. Excellence in quality education can be achieved by evaluating the true ability of the learners with the help of continuous evaluation.

D-2 Salient features of the grading system:

1. In this system, students (learners) are placed in ability bands that represent a range of scores. This ability range may be designated with alphabetical letters called as '**GRADE'**.
2. Grading reflects an individual learner's performance in the form of a certain *level of achievement.*
3. The Grading system ensures natural classification in qualitative terms rather than quantitative terms since it expresses a range /band of scores to which a learner belongs such as O,A,B,C,P & F
4. Grades can be interpreted easily and directly and can be used to prepare an accurate *'profile'* of a learner.
5. A properly introduced grading system not only provides for a comparison of the learners' performance but it also indicates the quality of performance with respect to the amount of efforts put in and the amount of knowledge acquired at the end of the course by the learners.

D-3 Basics of Credit and Grading System

Grading is a method of reporting the result of a learner's performance subsequent to his evaluation. It involves a set of alphabets which are clearly defined and designated and uniformly understood by all the stakeholders. Grading is carried out in a variety of ways. The classification of grades depends upon the reference point.

With 'Approach towards Grading' as the reference point, Grading may be classified as:

a) **Direct grading**: When the performance exhibited by the examinees is assessed in qualitative terms and the impressions so obtained by the examiners are directly expressed in terms of letter grades, it is called, '*Direct Grading*'.

b) **Indirect grading**: When the performance displayed by the examinees is first assessed in terms of marks and subsequently transformed into letter grades by using different modes, it is called, '*Indirect Grading.*'

With 'Standard of Judgment', as the reference point Grading may be classified as:

a) **Absolute grading**: The method that is based on a predetermined standard which becomes a reference point for the learner's performance is called 'Absolute Grading'. This involves direct conversion of marks into grades irrespective of the distribution of marks in a subject.
b) **Relative grading**: Relative Grading is popularly known as grading on the curve. The curve refers to the normal distribution curve or some symmetric variant of it. This method amounts to determining in advance approximately what percentage of learners can be expected to receive different grades, such as O,A,B,C,D,E,F. In this grading system the grade is not determined by the learner's performance but on the basis of group performance.

Absolute grading has several advantages such as:

a) The procedure is simple and straightforward to use,
b) Each grade is distinctly understandable,
c) The learner has the freedom to strive for the attainment of the highest possible grade and
d) It enables the learners to know their strengths and weaknesses.

The few limitations of Absolute Grading method are:

a) The distribution of scores is taken at its face value regardless of the errors of measurement creeping in due to various types of subjectivity.
b) Besides, the cut-offs of different categories are also arbitrarily decided.

It is proposed to use the **Indirect and Absolute Grading System for the MCA programme** i.e. the assessment of individual Courses in the concerned examinations will be on the basis of marks. However the marks shall later be converted into Grades by a **defined mechanism** wherein the overall performance of the learners can be reflected after considering the Credit Points for any given course. The **overall evaluation shall be designated in terms of Grade.**

E. Session Duration:

Each teaching-learning, evaluation session shall be of 90 minutes. However, institutes shall have the flexibility to define their time slots in a manner as to use their faculty and infrastructure resources in the best possible way.

F. Courses Offered:

Institutes are free to offer at least two specialized tracks. It is envisaged that Institutes offer only those tracks /electives for which they have the required faculty competencies and relevant resources.

It shall be mandatory for the Institutes to provide all information relating to the specialized tracks offered, their respective credits, evaluation pattern, etc. to all the students so as to enable them to make an informed choice. Such information should be hosted on the website/prospectus of the Institute in sufficient advance, prior to commencement of the classes. Other information such as the credits, the prerequisites, and syllabus shall also be hosted on the website of the institute.

G. Registration:

Such registration shall be the basis for a student to undergo concurrent evaluation, online evaluation and end semester examination. Application forms for University examinations are to be filled up based on the choices finalized during the registration process and submitted to the University along with the prescribed examination fee.

G-1 Registration Process:

Each student, on admission shall be assigned to a ***Faculty Advisor*** who shall advise her/him about the academic programs and counsel on the choice of courses considering the student's profile and career objectives.

i. With the advice and consent of the Faculty Advisor the student shall register for a set of courses he/she plans to take up for the Semester.
ii. The student should meet the criteria for prerequisites, if defined for a course, to become eligible to register for that course.
iii. The Institute shall follow a selection procedure on a first come first served basis, determining the maximum number of students and counseling the students if required to avoid overcrowding to particular course(s) at the expense of some other courses.
iv. It is expected that a student registers for 27 credits in Semester I, II, III, IV, V and 25 Credits in Semester VI.
v. The maximum number of students to be registered in each specialized TRACK shall depend upon the physical facilities available. Every effort shall be made by the Institute to accommodate as many students as possible.
vi. The Institute may not offer a specialized track if a minimum of 33% of students are not registered for that course.

(V) Assessment:

In total 160 credits represent the workload of a year for MCA program.
Total credits=160, 1 credit = 15 lecture Hrs, 100 Marks Subject = 4 Credits

Semester – I	27 credits
Semester – II	27 credits
Semester – III	27 credits
Semester – IV	27 credits
Semester – V	27 credits
Semester – VI	25 credits

Credit hours are based on the number of "contact hours" per week in class, for one term; formally, Semester Credit Hours. One credit will represent 12 to 15 teaching hours depending on technical and management subjects.

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

In general

1. For each paper, 30% marks will be based on internal assessment and 70% marks for semester and examination (external assessment), unless otherwise stated.
2. The division of the 30marks allotted to internal assessment of theory papers is on the basis of tutorial paper and assignments of 15 marks and seminars / presentations and attendance of 15 marks.
3. The marks of the practical would be given on internal practical exam, oral and lab assignments.
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.

(VI) 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.

VI-A

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 / Caselet's / 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

There shall be *a minimum of three concurrent evaluation components per full credit course and five concurrent evaluation components for each half credit course.* The faculty shall announce in advance the units based on which each concurrent evaluation shall be conducted. Each component shall ordinarily be of 10 marks. The Institute shall however have the liberty to conduct additional components (beyond three/five). However the total outcome shall be scaled down to 30/50 marks for full credit and half credit courses respectively. Marks for the concurrent evaluation must be communicated by the Institute to the University as per the schedule declared by the University. Detailed record of the Concurrent Evaluation shall be maintained by the Institute. The same shall be made available to the University, on demand.

At the end of Concurrent Evaluation (out of 30/50 marks) the student does NOT have a facility of Grade Improvement, if he/she has secured any grade other than F.

VI-B

Safeguards for Credibility of Concurrent Evaluation: The following practices are encouraged to enhance transparency and authenticity of concurrent evaluation:

a) Involving faculty members from other management institutes.
b) Setting multiple question paper sets and choosing the final question paper in a random manner.
c) One of the internal faculty members (other than the course teacher) acting as jury during activity based evaluations.
d) Involvement of Industry personnel in evaluating projects / field based assignments.
e) Involvement of alumni in evaluating presentations, role plays, etc.
f) 100% moderation of answer sheets, in exceptional cases.

(VII) Standard of Passing:

Every candidate must secure at least Grade P in Concurrent Evaluation as well as University Examination as separate heads of passing for each course.

Conversion of Marks to Grade Points & Grades: The marks shall be converted to grade points and grades using Table I below.

Table I: Points Grading System

Sr. No	Marks	Grade	Grade Point
1	80-100	O : Outstanding	10
2	70-79	A+ : Excellent	9
3	60-69	A: Very Good	8
4	55-59	B+ : Good	7
5	50-54	B:Above Average	6
6	45-49	C: Average	5
7	40-44	P:Pass	4
8	0-39	F:Fail	0
9		Ab : Absent	0

Reassessment of Internal Marks:

In case of those who have secured less than passing percentage of marks in internal i.e. less than 40%, the institute will administer a separate internal test. The results of which may be conveyed to the University as the Revised Internal Marks.

In case the result of the revised internal test is lower than the original marks then the original marks will prevail. In short, the rule is higher of the two figures should be considered.

However, the institute will not administer any internal test, for any subject for those candidates who have already secured 40% or more marks in the internal examination.

VIII) Backlog:

Candidates can keep terms for any semester of M.C.A., irrespective of the number of subjects in which he/she has failed in the previous MCA semester examinations.

(IX) Board of Paper Setters /Examiners:

For each Semester and examination there will be one board of Paper setters and examiners for every course. While appointing paper setter /examiners, care should be taken to see that there is at least one person specialized in each unit course.

(x) Class:

The performance of a student will be evaluated in terms of two indices, viz.

a) *Semester Grade Point Average (SGPA)* which is the Grade Point Average for a semester
b) *Cumulative Grade Point Average (CGPA)* which is the Grade Point Average for all the completed semesters at any point in time.

Semester Grade Point Average (SGPA): At the end of each semester, SGPA is calculated as the weighted average of GPI of all courses in the current semester in which the student has passed, the weights being the credit values of respective courses.

SGPA = Grade Points divided by the summation of Credits of all Courses.

$$SGPA = \frac{\sum \{C * GPI\}}{\sum C} \text{ for a semester.}$$

Where GPI is the Grade and C is credit for the respective Course.

Cumulative Grade Point Average (CGPA): Cumulative Grade Point Average (CGPA) is the grade point average for all completed semesters. CGPA is calculated as the weighted average of all GPI of all courses in which the student has passed up to the current semester.

Cumulative Grade Point Average (CGPA) for the Entire Course

$$SGPA = \frac{\sum \{C * GPI\}}{\sum C} \text{ for all semesters taken together.}$$

Where GPI is the Grade and C is credit for the respective Course.

IMPORTANT NOTE:
If a student secures F grade in either or both of Concurrent Evaluation or University Evaluation for a particular course his /her credits earned for that course shall be ZERO.

Award of Grade Cards: The University of Pune under its seal shall issue to the learners a grade card on completion of each semester. The final Grade Card issued at the end of the final semester shall contain the details of all courses taken during the entire programme for obtaining the degree.

Final Grades: After calculating the SGPA for an individual semester and the CGPA for entire programme, the value shall be matched with the grade in the Grade Points & Descriptors Table as per the Points Grading System and expressed as a single designated GRADE (as per Table II)

Table II: Grade Points & Descriptors

O: Outstanding	**Excellent analysis of the topic, (80% and above)** *Accurate knowledge of the primary material, wide range of reading, logical development of ideas, originality in approaching the subject, Neat and systematic organization of content, elegant and lucid style;*
A+ : Excellent	**Excellent analysis of the topic (70 to 79%)** *Accurate knowledge of the primary material, acquaintance with seminal publications, logical development of ideas, Neat and systematic organization of content, effective and clear expression;*
A: Very Good	**Good analysis and treatment of the topic (60 to 69%)** *Almost accurate knowledge of the primary material, acquaintance with seminal publications,logical development of ideas, Fair and systematic organization of content, effective and clear expression;*
B+: Good	**Good analysis and treatment of the topic (55to 59%)** *Basic knowledge of the primary material, logical development of ideas, Neat and systematic organization of content, effective and clear expression*;
B: Above Average	Some important points covered **(50to 54%)** *Basic knowledge of the primary material, logical development of ideas, Neat and systematic organization of content, good language or expression*;
C: Average	Some points discussed **(45 to 49%)** *Basic knowledge of the primary material, some organization, acceptable language or expression*;
P: Pass	Any two of the above **(40 to 44%)**
F: Fail	None of the above **(0 to 39%)**

A student who secures grade P or above in a course is said to have completed /earned the credits assigned to the course. A student who completed the minimum credits required for the MBA programme shall be declared to have completed the programme.

NOTE:
The Grade Card for the final semester shall indicate the following, amongst other details:

a) Grades for concurrent and university evaluation, separately, for all courses offered by the student during the entire programme along with the grade for the total score.
b) SGPA for each semester.
c) CGPA for final semester.
d) Total Marks Scored out of Maximum Marks for the entire programme, with break-up of Marks Scored in Concurrent Evaluation and University Evaluation.
e) Marks scored shall not be recorded on the Grade Card for intermediate semesters.
f) The grade card shall also show the 10-point scale and the formula to convert GPI, SGPA, and/or CGPA to percent marks.

(XI) Medium of Instruction:

The medium of Instruction will be English.

(XII)Clarification of Syllabus:

It may be necessary to clarify certain points regarding the course. The syllabus Committee should meet at least once in a year to study and clarify any difficulties from the Institutes.

(XIII) Revision of Syllabus:

As the computer technology is changing very fast, revision of the syllabus should be considered every 3 years.

(XIV)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 students study all-round the semester. *Therefore, there shall not be any preparatory leave before the University examinations.*

(XV)ATKT Rules:

A student shall earn the credits for a given course in **MAXIMUM FOUR ATTEMPTS**.

(XVI)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.

MCA SYLLABUS STRUCTURE 2015-2018

SEMESTER I				
Subject Title	**Subject Code**	**CP**	**EXT**	**INT**
1. Fundamentals of Computer	IT11	4	70	30
2. C Programming with Data Structure	IT12	4	70	30
3. Software Engineering	IT13	4	70	30
4. Database Management System	IT14	4	70	30
5. Principles and Practices of Management and Organizational Behavior	BM11	4	70	30
6. Business Process Domains*	BM12	2	-	70
Practical*				
7. C and DS Lab	IT12L	2	-	50
8. DBMS Lab	IT14L	2	-	50
Soft Skills *				
9. Word Power	SS11	1	-	30
Semester I Total Marks			**E**	**I**
		27	**350**	**350**

SEMESTER II				
Subject Title	**Subject Code**	**CP**	**Ext.**	**Int.**
1. Essentials of Operating System	IT21	4	70	30
2. Web Technologies	IT22	4	70	30
3. Core Java	IT23	4	70	30
4. Essentials of Networking	IT24	4	70	30
5. Discrete Mathematics	MT21	4	70	30
6. Essentials of Marketing*	BM21	2	-	70
Practical *				
7. Mini Project using Web Technology	IT22L	2	-	50
8. Core Java Lab	IT23L	2	-	50
Soft Skills *				
9. Oral Communication	SS21	1	-	30
Semester II Total Marks		**-**	**E**	**I**
		27	**350**	**350**

SEMESTER III				
Subject Title	**Subject Code**	**CP**	**Ext.**	**Int.**
COMMON SUBJECT FOR ALL TRACKS FOR SEMESTER III				
1. Probability and Combinatorics	MTC31	4	70	30
2. Multimedia Tools for Presentation*	ITC31	2	-	70
3. Soft Skills-Presentation *	SSC31	1	-	30
TRACK I : SOFTWARE & APPLICATION DEVELOPMENT				
4. Advanced Data Structure and C++ programming	T1-IT31	4	70	30
5. Design and Analysis of Algorithms (DAA)	T1-IT32	4	70	30
6. Object Oriented Analysis and Design	T1-IT33	4	70	30
7. Advanced Internet Technology	T1-IT34	4	70	30
Practical*				
8. DS & C++ Lab	T1-IT31L	2	-	50
9. Mini Project using AIT	T1-IT34L	2	-	50
TRACK II :INFRASTRUCTURE & SECURITY MANAGEMENT				
4. IT Infrastructure Architecture	T2-IT31	4	70	30
5. Data Centre Architecture & Storage Management	T2-IT32	4	70	30
6. Introduction to Information Security	T2-IT33	4	70	30
7. Office Automation Tools	T2-IT34	4	70	30
Practical*				
8. Mini Project on IT Architecture and Information Security	T2-IT31L	2	-	50
9. Office Automation Tools – Lab	T2-IT34L	2	-	50
TRACK III : INFORMATION MANAGEMENT & QUALITY CONTROL				
4. Enterprise Resource Planning	T3-IT31	4	70	30
5. Data Communication & Computer Networks	T3-IT32	4	70	30
6. Data Warehouse, Mining, BI Tools& applications	T3-IT33	4	70	30
7. Information Security & Audit	T3-IT34	4	70	30
Practical*				
8. DCCN Lab	T3-IT32L	2	-	50
9. BI Tools Lab	T3-IT33L	2	-	50
TRACK IV :NETWORKING				
4. Network Administration I	T4-IT31	4	70	30
5. Windows Server Configurations	T4-IT32	4	70	30
6. IT Infrastructure Monitoring	T4-IT33	4	70	30
7. Linux Administration I	T4-IT34	4	70	30
Practical*				
8. Network Administration Lab – I	T4-IT31L	2	-	50
9. Server Configuration Lab (Windows and Linux)	T4-IT32L	2	-	50

SEMESTER IV				
Subject Title	**Subject Code**	**CP**	**Ext.**	**Int.**
COMMON SUBJECT FOR ALL TRACKS FOR SEMESTER IV				
1. Optimization Techniques	ITC41	4	70	30
2. Research Methodology & Statistical Tools*	ITC42	2	-	70
3. Soft Skills -Interview *	SSC41	1	-	30
TRACK I : SOFTWARE & APPLICATION DEVELOPMENT				
4. Advanced Java	T1-IT41	4	70	30
5. Python programming	T1-IT42	4	70	30
6. Advance DBMS	T1-IT43	4	70	30
7. Cloud Computing	T1-IT44	4	70	30
Practical *				
8. Adv. Java Lab	T1-IT41L	2	-	50
9. Python Programming Lab	T1-IT42L	2	-	50
TRACK II :INFRASTRUCTURE & SECURITY MANAGEMENT				
4. Identity and Access Management	T2-IT41	4	70	30
5. IT Advisory Services	T2-IT42	4	70	30
6. Infrastructure Security Audit	T2-IT43	4	70	30
7. Enterprise Solutions Architecture	T2-IT44	4	70	30
Practical *				
8. Identity and Access Management Lab	T2-IT41L	2	-	50
9. Mini Project on IT Advisory Services and Enterprise Solutions Architecture	T2-IT42L	2	-	50
TRACK III : INFORMATION MANAGEMENT & QUALITY CONTROL				
4. E Commerce & Knowledge Management	T3-IT41	4	70	30
5. Cyber Laws & Intellectual Property Rights	T3-IT42	4	70	30
6. Customer Relationship Mgmt& Supply Chain Mgmt	T3-BM43	4	70	30
7. Software Quality Assurance & Control	T3-IT44	4	70	30
Practical*				
8. Mini Project based on CRM & SCM	T3-IT43L	2	-	50
9. Software Quality Assurance Lab	T3-IT44L	2	-	50
TRACK IV :NETWORKING				
4. Network Administration II	T4-IT41	4	70	30
5. Internet of Things	T4-IT42	4	70	30
6. Linux Administration II	T4-IT43	4	70	30
7. Wireless Networks	T4-IT44	4	70	30
Practical*				
8.Virtulization Lab	T4-IT41L	2	-	50
9.Wireless Network Lab	T4-IT44L	2	-	50

SEMESTER V				
Subject Title	**Subject Code**	**CP**	**Ext.**	**Int.**
COMMON SUBJECT FOR ALL TRACKS FOR SEMESTER V				
1. Software Project Management	ITC51	3	70	-
2.Project *	ITC51P	3	-	100
3.Soft Skills - Group Discussion*	SSC51	1	-	30
TRACK I : SOFTWARE & APPLICATION DEVELOPMENT				
4. ASP .Net using C#	T1-IT51	4	70	30
5. Service Oriented Architecture	T1-IT52	4	70	30
6. Big Data Analytics	T1-IT53	4	70	30
7. Mobile Application Development	T1-IT54	4	70	30
Practical *				
8. Mini Project using ASP .Net	T1-IT51L	2	-	50
9. Mini Project Using Mobile Application Development	T1-IT54L	2	-	50
TRACK II :INFRASTRUCTURE & SECURITY MANAGEMENT				
4. Quality verification	T2-IT51	4	70	30
5. Infrastructure Auditing & Implementation	T2-IT52	4	70	30
6. IT Service Management	T2-IT53	4	70	30
7. Digital and e-business Infrastructure and security mechanism	T2-IT54	4	70	30
Practical*				
8. Mini Project on Infrastructure Audit	T2-IT52L	2	-	50
9. Design of digital and e-business infrastructure and security mechanism	T2-IT54L	2	-	50
TRACK III : INFORMATION MANAGEMENT & QUALITY CONTROL				
4.Software Testing & Tools	T3-IT51	4	70	30
5.Entrepreneurship Development	T3-BM52	4	70	30
6.Decision Support System	T3-IT53	4	70	30
7.Business Architecture	T3-IT54	4	70	30
Practical *				
8. CASE Tools Lab	T3-IT51L	2	-	50
9. Activities based on Entrepreneurship Development	T3-BM52L	2	-	50
TRACK IV :NETWORKING				
4. Network Routing Algorithms	T4-IT51	4	70	30
5. Computer and Network Security	T4-IT52	4	70	30
6. Cloud Architectures and Security	T4-IT53	4	70	30
7. Unified Communication	T4-IT54	4	70	30
Practical *				
8. Computer and Network Security – Lab	T4-IT52L	2	-	50
9. Cloud Building within Organization (Deployment of cloud and cloud based applications)	T4-IT53L	2	-	50

SEMESTER VI				
Subject Title	**Subject Code**	**CP**	**Ext.**	**Int.**
COMMON SUBJECTS				
1. Open subject for each TRACK*	ITC61	3	-	70
Practical *				
2. Open subject LAB	ITC61L	1	-	30
3.Project	ITC61P	15	250	-
		6	-	150

* : Departmental Subject
CP : Credit Points
Ext. : External Subject
Int. : Internal subject

Hardware and Software Requirements for all semesters

1	Open source IDE for C/C++ Editor/JAVA/Website designing
	Open source application server(s) : WAMP/XAMP etc.
2	Open Source Databases: Postgre SQL/MySQL/SQLite etc.
3	Open Source Accounting Packages: Tally Edu. Mode/GnuCash/LedgerSMB/TurboCASH
4	Open Source office suite : WPS Office Free/Suite Office/Open Office/ LibreOffice etc.
5	Open source Operating System : Linux (Fedora/Ubuntu) etc.
6	Microsoft Windows Operating System for [20 Machines for intake of 60 students]
7	Two Servers are mandatory [One Linux server & One Windows server] • Windows Server : Microsoft Windows Server for 20 users for intake of 60 students • Linux Server : Fedora/Ubuntu

Note: Institutes may use any other alternate open source software.

Hardware Requirements:		
Desktop Computers :	Processor: Dual Core or above	RAM: Min. 2 GB or Above
Server :	Processor: Xeon/equivalent AMD or above	RAM: Min 8 GB or above

Note: NComputing and similar technologies are not recommended