

Savitribai Phule Pune University
Postgraduate Programme
Master of Computer Applications (MCA)
(Choice Based Credit System)
(Faculty of Science & Technology)

Course Structure, Guidelines, Rules and
Regulations



Effective from Year 2019-20

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Preamble

The revised curriculum structure, rules and regulations for programme Master of Computer Applications (MCA) (credit system) under Engineering with effect from year 2019 -20 is presented here. The curriculum is designed to minimize the gap in requirements of Industry. The basic objective of the revision is to prepare the students with the necessary knowledge, skills and foundation required for Application development in tune with recent technology advancements. The MCA programme emphasizes more on application developments and so more focus is on latest programming languages, platforms and tools to develop efficient applications using integrated approach.

General Guidelines:

1. The MCA programme, under Engineering (Faculty of Science & Technology) shall be offered with **125 credit**; one credit is equivalent to 15 contact hours.
2. The MCA programme under Faculty of Science & Technology will be of **three years** duration and **six semesters**.
3. The total number of credits required to earn for the **completion of the programme is 125 in six semesters**.
4. Assessments in credit system consist of A) In_Semester (Internal Examination & Assessment) B) End_Semester (external examination & Assessment). Assessment and Evaluation is to be done as per guidelines provided by authority.
5. **Project Based Learning (PBL)**
For better learning experience, along with traditional classroom teaching and laboratory work based learning; project based learning has been introduced with objective to motivate students to learn by working in group cooperatively to solve a problem. Student may undertake projects as per the needs of industries. Second objective is to inculcate independent learning by problem solving with social context. [2]
6. **Laboratory Course:**
The laboratory work will be based on completion of experiments/ lab assignments confined to the related companion courses of the semester.
7. **Seminar & technical Communication:**
Seminar shall be based on state-of-the-art topic selected by student and approved by an authority. The student shall submit the duly certified seminar report in standard format, for satisfactory completion of the work by the concerned Guide and head of the department/institute.
8. **Project Work at Final Year:**
Project work is in the sixth semester and an integral part of the course. The project work shall be based on the knowledge acquired by the student during the course. The project aims to provide an opportunity of designing and building complete system or subsystems based on area where the student likes to acquire specialized skills. Project work is to be carried out either individually or in a group. Each group or individual will be assigned a guide. At the end of the term the student should submit the project report in a prescribed format.
9. **Abbreviations:**
TW: Term Work, **TH:** Theory, **End_Sem:** Theory External Examination, **In_Sem:** Internal Examination & Assessment, **OR:** Oral, **PR:** Practical, **Sem:** Semester, **PROJ:** Project Work.

10. Definition of Credit [3]:

1 Hour Lecture (L) per week	1 credit 1 Hour
Practical (P) per week 2 Hours Practical(Lab)/week	1 credit 2 Hours

This document includes following sections-

1. MCA Programme Structure and credit distribution
2. Examination Scheme
3. Structure of Question Paper
4. Assessment
5. Rules of Passing
6. Rules of ATKT
7. Grade Point Average
8. Performance Indices
9. Result
10. References

1) MCA Programme Structure and Credit Distribution:

MCA programme is of 3 years and six semesters duration. The Credit distribution for MCA programme is given below in table 1[1] [5].

Table 1: Credit Distribution

Course	Semeste r_1	Semeste r_2	Semest er_3	Semeste r_4	Semeste r_5	Semest er_6	Total
Professional Theory Core Courses *	16	16	16	13	13	-	74
Elective Theory Courses^	-	-	-	03	03	-	06
Laboratory Courses	05	05	05	05	03	-	23
Seminar & Technical Communication Skills	-	-	01	-	01	-	02
Project Work	-	-	-	-	02	14	16
Project Based Learning	-	01	-	01	-	--	02
Industry Internship*	-	-	-	-	02	--	02
Audit course per semester#							--
Total	21	22	22	22	24	14	125

*: Professional Courses include –core domain courses and courses like- Humanities and Social Sciences including Management/soft skill courses.

^: Elective courses relevant to chosen specialization and Open Electives (interdisciplinary and /or emerging technology)

#: There will be mandatory Audit Course per Semester viz- Humanities and Social Sciences, Environmental Studies, Professional Ethics and Etiquettes, MOOC, Foreign language etc.

*Mandatory Internship as per guidelines provided is to be completed strictly during vacations after semester 4. 1 credit for 2 Week duration certified by the industry/organization is to be awarded after successful completion and compliance.

TABLE -2 Course Structure for Semester_1

Course Code	Course	Teaching Scheme Hours/Week		Examination Scheme						Credit	
		TH	PR	In-Sem	End Se m	TW	OR	PR	Total Marks	TH	PR
310901	Discrete Mathematics	3	-	30	70	-	-	-	100	3	
310902	Data Structures	4	-	30	70	-	-	-	100	4	
310903	Object Oriented Programming	3	-	30	70	-	-	-	100	3	
310904	Principles of Programming	3	-	30	70	-	-	-	100	3	
310905	Management Theory and Practices	3	-	30	70	-	-	-	100	3	
310906	Data Structures Laboratory	-	4	-	-	50	-	50	100		2
310907	Object Oriented Programming Laboratory	-	4	-	-	50	-	50	100		2
310908	Programming Language Laboratory	-	2	-	-	50		50	100		1
	Total	16	10	150	350	150	-	150	800	21	
310909	Audit Course -1: AC1-I Humanities and Social Sciences AC1-II Road Safety									Grade	

TABLE -3 Course Structure for Semester_2

Course Code	Course	Teaching Scheme Hours/Week		Examination Scheme						Credit	
		TH	PR	In-Sem	End _Se m	TW	OR	PR	Total Marks	TH	PR
310910	Probability & Statistics	3	-	30	70	-	-	-	100	3	
310911	Systems Programming & Operating System (SPOS)	4	-	30	70	-	-	-	100	4	
310912	Database Management System	3	-	30	70	-	-	-	100	3	
310913	Java Programming	3	-	30	70	-	-	-	100	3	
310914	Computer Organization	3		30	70	-	-	-	100	3	
310915	Database Management System Laboratory	-	4	-	-	50	-	50	100		2
310916	SPOS Laboratory	-	2	-	-	50	-	-	50		1
310917	Java Programming Laboratory	-	4	-	-	50	-	50	100		2
310918	Project Based Learning-I	-	2	-	-	50	-	-	50		1
	Total	16	12	150	350	200	--	100	800	22	
310919	Audit Course -2: AC2-I Foreign Language AC2-II Environmental Studies									Grade	

TABLE -4 Course Structure for Semester_3

Course Code	Course	Teaching Scheme Hours/Week		Examination Scheme						Credit	
		TH	PR	In-Sem	End Sem	TW	OR	PR	Total Marks	TH	PR
410901	Web Programming	3	-	30	70	-	-	-	100	3	-
410902	Banking and Finance	3	-	30	70	-	-	-	100	3	-
410903	Computer Networks	4	-	30	70	-	-	-	100	4	-
410904	Python Programming	3	-	30	70	-	-	-	100	3	-
410905	Management Information System	3	-	30	70	-	-	-	100	3	-
410906	Computer Network Laboratory	-	2	-	-	50	-	-	50	-	1
410907	Web Programming Laboratory	-	4	-	-	25	-	50	75	-	2
410908	Python Programming Laboratory	-	4	-	-	25	-	50	75	-	2
410909	Soft skills Laboratory	-	2	-	-	50	-	-	50	-	1
410910	Seminar and Technical Communication Skills-I	-	2	-	-	50	-	-	50	-	1
	Total	16	12	150	350	150	-	100	800	22	
410911	Audit Course 3: AC3-I: Digital and Social Media Marketing AC3-II: Foreign Language									Grade	

TABLE -5 Course Structure for Semester_4

Course Code	Course	Teaching Scheme Hours/Week		Examination Scheme						Credit	
		TH	PR	In-Sem	End Sem	TW	OR	PR	Total Marks	TH	PR
410912	Software Engineering & Project Management	4	-	30	70	-	-	-	100	4	-
410913	Mobile Computing	3	-	30	70	-	-	-	100	3	-
410914	Data Science with R	3	-	30	70	-	-	-	100	3	-
410915	Object Oriented Modeling and Design	3	-	30	70	-	-	-	100	3	-
410916	Elective- I	3	-	30	70	-	-	-	100	3	-
410917	Mobile Computing Laboratory	-	4	-	-	50	-	50	100	-	2
410918	OOMD Laboratory	-	2	-	-	50	-	-	50	-	1
410919	Data Science with R Laboratory	-	4	-	-	50	-	50	100	-	2
410920	Project Based Learning -II	-	2	-	-	50	-	-	50	-	1
	Total	16	12	150	350	200	-	100	800	22	
410921	Audit Course 4: AC4-I: Professional Ethics and Etiquettes AC4-II: MOOC- Learn New Skills AC4-III: Foreign Language									Grade	

§ - Industrial Internship to be undertaken in the vacation after 4th Semester. Preferably, the same company should be continued for project work. Necessary proofs and documents to be maintained by the student and department.

TABLE -6 Course Structure for Semester_5

Course Code	Course	Teaching Scheme Hours/Week		Examination Scheme						Credit	
		TH	PR	In-Sem	End Sem	TW	OR	PR	Total Marks	TH	PR
510901	Data Mining & Business Intelligence	3	-	30	70	-	-	-	100	3	-
510902	Cloud Computing	3	-	30	70	-	-	-	100	3	-
510903	Software Testing & Quality Assurance	4	-	30	70	-	-	-	100	4	-
510904	Operations Research	3	-	30	70	-	-	-	100	3	-
510905	Elective- II	3	-	30	70	-	-	-	100	3	-
510906	Seminar and Technical Communication	-	2	-	-	50	-	-	50	-	1
510907	Data Mining & Business Intelligence Laboratory	-	4	-	-	50	-	50	100	-	2
510908	Software Testing & Quality Assurance Laboratory	-	2	-	-	50	-	-	50	-	1
510909	Seminar and Technical Communication Skills -II	-	2	-	-	50	-	-	50	-	1
510910	Project Stage-I*	-	4	-	-	50	--	-	50	-	2
510911	Industrial Internship \$		--	--	--	50	--	--	50	-	2
	Total	16	12	150	350	300	--	50	850	24	
510912	Audit Course 5: AC5-I Entrepreneurship Development AC5-II: MOOC- Learn New Skills									Grade	

\$ - Industrial Internship to be undertaken in the vacation after 4th Semester. Preferably, the same company should be continued for project work. Necessary proofs and documents are to be maintained by the student and department. Work to be evaluated by the concerned staff. Students should present to the peers and department the work undertaken and submit a report of the same.

* Project Stage I expects the student to complete the project till the design.

ELECTIVE-I		ELECTIVE-II	
Artificial Intelligence		Machine Learning	
Information Security		Big Data Analytics	
Animation and Gaming		Blockchain Technology	
Internet of Things		Open Elective	

TABLE -7 Course Structure for Semester_6

Course Code	Course	Teaching Scheme Hours/Week		Examination Scheme						Credit
		TH	PR	In-Sem	End Sem	TW	OR	PR	Total Marks	
510912	Project Stage-II	--	28	--	--	100	150	--	250	14
	Total	--	28	--	--	100	150	--	250	14
510913	Audit Course 6: AC6-I Entrepreneurship Development AC6-II: MOOC- Learn New Skills									Grade

2. Examination Scheme:

R2.1 Internal Continuous assessment of 30 marks for all theory courses.

R2.2 End-Semester written theory Examination of 70 marks based on all six units of course syllabus as per schedule of university.

3. Structure of Question Paper:

R3.1 Marks weightage to be given for questions per unit is as follows –

TABLE -8. Marks weightage per question per unit per examination

Unit Number	Theory External Examination Marks weightage
1	11
2	12
3	12
4	11
5	12
6	12

R3.2 Paper will have only one section. For each question there will be OPTIONAL Question based on same unit and of same marks.

4. Assessment

A. Term work:

Term Work assessment shall be conducted for the Lab Practice, Project and Seminar. Term work is continuous assessment based on work done, submission of work in the form of report/journal, timely completion, attendance, and understanding. It should be assessed by course teacher of the institute for all semester. At the end of the semester, the final marks for a Term Work shall be assigned based on the performance of the student and is to be submitted to the Savitribai Phule Pune University.

B. Practical/Oral/Presentation:

Practical/Oral/presentation is to be conducted and assessed jointly by internal and external examiners. The performance in the Practical/Oral/Presentation examination shall be assessed by at least one pair of examiners appointed as examiners by the Savitribai Phule Pune University. The examiners will prepare the mark / grade sheet in the format as specified by the Savitribai Phule Pune University, authenticate and seal it.

C. Theory Internal Assessment

The teacher would evaluate a student towards a course through interaction throughout the semester which would include one or more of the following mechanisms.

- Written test – Max 2 with not more than 15 marks for each
- Assignment – Max 2 with not more than 5 marks for each
- Seminar presentation – 5 marks
- Group discussion – 5 marks
- f. An open book test – 10 marks (to be conducted in a classroom)
- g. MCQ test - 10 marks

A teacher may propose any other mean towards internal assessment (other than written test) that may suit for a particular course and implement only after the approval of the Departmental Committee constituted and approved by the HoD.

D. Project Based Learning:

Project is to be carried out in a group of 4 students. Each group will be assigned a guide. At the end of the term the students should submit 1 copy of the report in a prescribed format provided by the institute duly signed by the guide and the head of the department. Staff members of the institute will assess the project internally [4].

E. Seminar and Technical Communication Skills

The seminar topic must be selected in consultation with institute guide. Each student will make the seminar topic presentation during the semester making use of audio/video/ICT tools for the duration of 30-35 minutes and submit the seminar report in a prescribed format provided by the institution duly signed by the guide and the head of the department. Attendance for all seminars for all students is compulsory. Staff members of the institute will assess the seminars internally.

F. Project Work

Progress of project work is monitored regularly on weekly project slot/project day. Regular interval presentations are to be arranged to review and assess the work. During process of monitoring and continuous assessment and evaluation the individual and team performance is to be measured. Project work is monitored and continuous assessment is done by guide and authorities. During university examination External examiners evaluate the project work. Recommended performance measure parameters may include-Problem definition and scope of the project, Requirement Analysis, Comprehensive Implementation- Design, modeling, documentation, Thorough Testing, Project Presentation and Demonstration(ease of use and usability), Presentation of work in the form of Project Report(s), Understanding individual capacity, Role & involvement in the project. Proper records/logbooks/ evaluation report need to be maintained at institute/department duly approved and verified by industry where the project work has been under taken.

G. Procedure for offering Open Elective:

Open elective proposal can be offered with Industry partner. A proposal with syllabus is to be forwarded to the Chairman BOS, before June / December every year. Approved syllabus through appropriate procedure can be taught in various colleges. Industry person and Teacher appointed together conduct the course is appreciated.

H. Industrial Internship:

Student may choose to undergo Internship at Industry/Govt sector. Student may choose either to work on innovation like IEEE paper implementation OR undergo internship with industry/Government organizations/Micro/Small/ Medium enterprises to make themselves ready for the industry[4].

Every student is required to prepare and maintain documentary proofs of the activities done by him. The evaluation of these activities will be done by Programme Head/ Project Head or Industry Supervisor based on- Overall compilation of internship activities, sub- activities, the level of achievement expected, evidence needed to assign the grades/marks and the duration for certain activities. It is necessary to produce participation certificate, if applicable.

Based on internship the assessment and evaluation parameters may include as-

- Work done in the industry (Technical / Business)
- Selection of real time projects.
- Actual contribution towards the project.
- Enhancement in the technical knowledge and communication skills.

5. Rules of Passing

R5.1

To pass the Term Work / Practical / Oral/ presentation the student has to earn Minimum of 40 percent marks in each respective examination head.

R5.2

To pass the Theory Course head the student has to earn minimum of 40 percent marks in End-Semester examination and 40 percent total marks (In-Semester Examination and End-Semester Examination).

R5.3

The failing student can repeat the End-semester examination to pass the head in any semester and the In-Semester assessment marks will be retained as it is.

R5.4

To earn credits of a course (Theory/term work/practical/oral/presentation) student must pass the course with minimum passing marks/grade.

R5.5

Student can apply ONLY for the Revaluation/Photocopying of End-Semester theory examination.

6. Rules of ATKT:

R6.1

A student can register for the third semester, if he/she earns minimum 50% credits of the total of first and second semesters.

R6.2

A student can register for the fifth semester, if he/she earns minimum 50% credits of the total of third and fourth semester and all the credits of first and second semester.

R6.3

A student will be awarded the degree if he/she earns 125 credits and successfully completes all the mandatory audit courses in respective semesters.

7. Grade Point Average:

R7.1 Marks/Grade/Grade Point

A grade is assigned to each head based on marks obtained by a student in examination of the course. The marks obtained in In-semester and end-semester examination are considered together to calculate the grade of the course. These grades, their equivalent grade points are given in Table 9.

TABLE 9. Grade and Grade Point

Grade	Grade Point	Percentage of Marks Obtained	Remarks
O	10	90-100	Outstanding
A	9	80-89	Very Good
B	8	70-79	Good
C	7	60-69	Fair
D	6	50-59	Average
E	5	40-49	Below Average
F	0	Below 40	Fail
FX	0	--	Detained, Repeat the Course
IC	0	--	Incomplete Course-- Absent for Exam but continue for the course
AC	--	--	Audit Course Completed
ACN	--	--	Audit Course Not Completed

Passing Grade:

- The grades O, A, B, C, D, E are passing grades.
- A candidate acquiring any one of these grades in a course shall be declared as PASS. And student shall earn the credits for a course only if the student gets passing grade in that course.
- The grade F shall be treated as a failure grade.
- The student with F grade will have to pass the concerned course by re-appearing for the examination.
- The student with F grade for any stage of the Project Work, will have to carry out additional work/ improvement as suggested by the examiners and re-appear for the examination.
- The student registered for audit course shall be awarded the grade AC after satisfactory completion of audit course and shall be included in the Semester grade report for that course, provided student has the minimum attendance as prescribed by the Savitribai Phule Pune University and satisfactory internal assessment performance and secured a passing grade in that course. Student who is unable to complete audit course will be awarded as ACN grade.

- The grade FX in a course is awarded by the college, if a student does not maintain the minimum attendance in the Lecture / Tutorial class as prescribed by the Savitribai Phule Pune University and/or his performance during the semester is not satisfactory and/or he/she fails in the Term Work head of that course.
- The student with FX grade in a given course is not permitted to take the end of semester examination in that course. Such a student will have to re-register for the course.
- The student with F / FX in a course shall not be awarded any credits for that course.

8. Performance Indices:

The semester end grade sheet will contain grades for the courses along with titles and SGPA. Final grade sheet and transcript shall contain CGPA.

SGPA -The performance of a student in a semester is indicated by a number called the Semester Grade Point Average (SGPA). The SGPA is the weighted average of the grade points obtained in all the courses, seminars and projects registered by the student during the semester.

$$\text{Semester Grade Point Average (SGPA)} = \frac{\sum_{i=1}^p C_i G_i}{\sum_{i=1}^p C_i}$$

$$\text{SGPA} = \frac{(\sum \text{GradePointsEarned} \times \text{CreditsForEachCourse})}{\text{TotalCredits}}$$

For Example: suppose in a given semester a student has registered for five courses having credits C1, C2, C3, C4, C5 and his / her grade points in those courses are G1, G2, G3, G4, G5 respectively.

Then students

$$\text{SGPA} = \frac{(C1G1 + C2G2 + C3G3 + C4G4 + C5G5)}{(C1 + C2 + C3 + C4 + C5)}$$

SGPA is calculated up to two decimal places by rounding off.

CGPA- The CGPA is the weighted average of the grade points obtained in all the courses (Theory/term work/practical/oral/presentation) of first semester to sixth semester for the students admitted in the First year. It is calculated in the same manner as the SGPA. In case of a student passing a failed course or in case of improvement, the earlier grade would be replaced by the new grade in calculation of the SGPA and CGPA.

9. Result:

Based on the performance of the student in the semester examinations, the Savitribai Phule Pune University will declare the results and issue the Semester Grade sheets. The class shall be awarded to a student on the CGPA calculated. The final grade shall be as per Table 10.

Table 10. CGPA and Class awarded

Sr. No.	CGPA	Class of the Degree Awarded
1.	7.75 or More than 7.75	First Class with Distinction
2.	6.75 or more but less than 7.75	First Class
3.	6.25 or more but less than 6.75	Higher Second Class
4.	5.5 or more but less than 6.25	Second Class

10. References

[1]<https://www.aicte-india.org/downloads/mcadegree.pdf>

[2]<https://www.aicteindia.org/sites/default/files/FINAL%20BEST%20PRACTICES%20IN%20AICTE%20APPROVED%20INSTITUTIONS.pdf>

[3] https://www.aicte-india.org/sites/default/files/Vol.%20I_UG.pdf

[4] <https://www.aicte-india.org/sites/default/files/ExaminationReforms.pdf>

[5]<https://www.aicte-india.org/sites/default/files/Latest%20AICTE%20-%20PG.pdf>