Savitribai Phule Pune University

RULES, REGULATIONS and CURRICULUM STRUCTURE

FOR

POST GRADUATE ROGRAMME IN
Master of Computer Applications (2020 Course)
UNDER

FACULTY OF SCIENCE AND TECHNOLOGY

With Effect from Year 2020-21

Savitribai Phule Pune University
Postgraduate Programme MCA (2020 Course)
Under Faculty of Science & Technology
Effective from Year 2020-21
Course Structure, Guidelines, Rules and Regulations

Preamble

The revised Credit System and Curriculum of Master of Computer Applications (MCA) (2020 Course) two years course under Engineering (with effect from year 2020 -21) is presented herewith project based learning. The Curriculum is designed to minimise the gap in requirements of Industry. The basic objective of the Curriculum is to prepare the students with the necessary knowledge, skills and foundation required for Application development [1].

The M.C.A. programme emphasizes more on Application Development and hence more focus is on latest programming languages and tools to develop better and efficient applications using integrated approach.

For this, the integrated lab concepts like project based learning are introduced in Semester II and Semester III. The Curriculum of Semester I and Semester II include the combination of various subject in the area of Information Technology and Mathematics.

General Guidelines

1. The MCA Programme, under Faculty of Science & Technology shall be offered with **80 credit** system; one credit is equivalent to 15contact hours.
2. The MCA Programme under Faculty of Science & Technology will be of **two years** duration and **four semesters**.
3. The total number of credits required to earn for the **completion of the Programme is 80 credits** in a minimum period of **four semesters**.
4. Assessments in credit system consist of A) End semester external examination B) Internal assessment for various examination heads. Assessment and Evaluation is to be done as per guidelines provided by authority.
5. **Project based Learning [2]**
   For better learning experience, along with traditional classroom teaching and laboratory work based learning; project 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. Such practice will also increase their capacity and learning through shared cognition.
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:**
   Shall be 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 with Industrial Internship:**
   Project work in the fourth semester is an integral part of the Course project work. The project work shall be based on the knowledge acquired by the student during the course and has to be done compulsorily as industrial internship. 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 at least two copies

of the project report in a prescribed format. Examination will be carried out by a pair of examiners for each group with one internal and one external examiner appointed by the University.

9. **Abbreviations:**
   TW: Term Work **TH:** Theory **Ext:** Theory External Examination **Int**: Theory Internal evaluation **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-
   I) MCA Programme Structure and Credit Distribution
   II) Examination Scheme
   III) Structure of Question Paper
   IV) Assessment
   V) Rules of Passing
   VI) Rules of ATKT
   VII) Assessment and Grade Point Average
   VIII) Performance Indices
   IX) Result
   X) References

I) MCA Programme Structure and Credit Distribution:

MCA programme is of 2 years duration. The minimum total number of credit requirement for programme is 80. In the structure, the credits are distributed over 4 semesters. The open elective included, gives the student a wide choice of subjects from other programme. The Credit structure for MCA programme is given below in table 1[1] [5].

Table 1: Credit Structure for MCA

Course Work	Semester_1	Semester_2	Semester_3	Semester_4	Total
Professional Theory Courses *	15	12	12	-	39
Elective Courses^	-	03	03	-	06
Laboratory Courses	06	05	05	-	16
Seminar & Technical Communication Skills	01	-	-	01	02
Project Work with Industrial Internship	-	-	-	15	15
Project Based Learning	-	01	01	-	02
Audit course per semester#	--				
Non Credit course (MOOC courses)##	--				
Total	22	21	21	16	80

*: Professional Courses include –Information technology, 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 Noncredit Course per Semester viz- Humanities and Social Sciences, Environmental Studies, Professional Ethics and Etiquettes, MOOC, Foreign language.

will be mandatory Noncredit Course MOOC in semester I, II and III.

TABLE -2 Structure for Semester_1

Year : First   Semester : I

Course Code	Course	Teaching Scheme Hours/Week		Examination Scheme						Credit	
		TH	PR	Int	Ext	TW	OR	PR	Total Marks	TH	PR
310901	Discrete Mathematics and Statistics	3	-	30	70	-	-	-	100	3	
310902	Data Structures and Algorithms	3	-	30	70	-	-	-	100	3	
310903	Object Oriented Programming	3	-	30	70	-	-	-	100	3	
310904	Software Engineering & Project Management	3	-	30	70	-	-	-	100	3	
310905	Information Systems and Engineering Economics	3	-	30	70	-	-	-	100	3	
310906	Data Structures and Algorithms Laboratory	-	4	-	-	25	-	50	75		2
310907	OOP Laboratory	-	4	-	-	25	-	50	75		2
310908	Python Programming Laboratory	1	2	-	-	50	-	-	50	1	1
310909	Business Communication Lab	-	2	-	-	50		-	50		1
	Total	16	12	150	350	150	-	100	750	22	
310910	AuditCourse-1									Grade	
310911	*Non Credit Course -1: MOOC Course-I- Swayam/Spoken Tutorial/NPTEL course									Grade	

310910-Audit Course 1(AC1) Options:
        AC1-I Foreign Language   AC1-II Road Safety

TABLE -3 Structure for Semester_2

Year : First   **Semester : II**

Course Code	Course	Teaching Scheme Hours/Week		Examination Scheme						Credit	
		TH	PR	Int	Ext	TW	OR	PR	Total Marks	TH	PR
310912	Database Management System	3	-	30	70	-	-	-	100	3	
310913	Computer Network	3		30	70				100	3	
310914	Java Programming	3	-	30	70	-	-	-	100	3	
310915	Operating Systems	3	-	30	70	-	-	-	100	3	
310916	Elective-I	3		30	70	-	-	-	100	3	
310917	Database Management System Laboratory	-	4	-	-	25	-	50	75		2
310918	Operating System Laboratory	-	2	-	-	50	-	-	50		1
310919	Java Programming Laboratory	-	4	-	-	25	-	50	75		2
310920	Project Based Learning-I (Mini Project- I)	-	2	-	-	50	-	-	50		1
	Total	15	12	150	350	150	--	100	750	21	
310921	Audit Course-2									Grade	
310922	*Non Credit Course -2: MOOC Course- II - Swayam/Spoken Tutorial/NPTEL course									Grade	

310921-Audit Course 2(AC2) Options:
AC2-I: Foreign Language   AC2-II: Environmental Studies
AC2-III: Augmented reality and Virtual Reality

TABLE -4 Structure for Semester_3

Year :Second   **Semester : III**

Course Code	Course	Teaching Scheme Hours/Week		Examination Scheme						Credit	
		TH	PR	Int	Ext	TW	OR	PR	Total Marks	TH	PR
410901	Data Science	3	-	30	70	-	-	-	100	3	
410902	Web Technologies	3	-	30	70	-	-	-	100	3	
410903	Cloud Computing	3	-	30	70	-	-	-	100	3	

Course Code	Course	TH	PR	Int	Ext	TW	OR	PR	Total Marks	Credit
410904	Elective- II	3	-	30	70	-	-	-	100	3
410905	Software Testing and Quality Assurance	3	-	30	70	-	-	-	100	3
410906	Web Technologies Lab	-	2	-	-	50	-	-	50	1
410907	#Computer Laboratory	-	4	-	-	25		50	75	2
410908	Data Science Laboratory		4	-	-	25		50	75	2
410909	Project Based Learning – II (Mini Project- II)	-	2	-	-	50		-	50	1
	Total	15	12	150	350	150	-	100	750	21
410910	Audit Course-3									Grade
410911	*Non Credit Course 3: MOOC Course-III- Swayam/Spoken Tutorial/NPTEL course									Grade

#Computer Laboratory is Software Testing Laboratory + Elective II Laboratory

410910-Audit Course 3(AC3) Options:
AC3-I: Foreign Language   AC3-II: Professional Ethics and Etiquettes
AC3-III: Mobile App development

TABLE -5 Structure for Semester_4

Year : Second   Semester : IV

Course Code	Course	Teaching Scheme Hours/Week		Examination Scheme						Credit
		TH	PR	Int	Ext	TW	OR	PR	Total Marks	
410912	Major Project with Industrial Internship	---	15	100	200	--	--	--	300	15
410913	Seminar on Major Project	---	2	50	--	--	--	--	50	1
	Total	--	17	150	200	---	--	---	350	16
410914	Audit Course-4									Grade

410914 -Audit Course 4 (AC4) Options:
AC4-I: Entrepreneurship Development   AC4– II: Digital and Social Media Marketing

Elective I	Elective- II
Mobile Computing	Big Data Analytics
Artificial Intelligence	Machine Learning
Cyber Security	Object Oriented Analysis and Design
Block Chain	Internet of Things
Open Elective	Open Elective

*Non Credit MOOC Courses: Non Credit course is compulsory. No grade points are associated with non-credit courses and are not accounted in the calculation of the performance indices SGPA & CGPA. Result of assessment will be PP or NP. Set of non-credit courses offered is provided. **Conduction and assessment of performance in said course is to be done at institute level.** The selection of 3 distinct non-credit MOOC courses, one per semester (Sem I, II & III) should be decided by respective institute.
The list of non credit MOOC courses suggested is given below

Suggested MOOC Courses-   Swayam /Spoken Tutorial/NPTEL

Sr. No.	Non Credit Course -1	Non Credit Course -2	Non Credit Course -3
1	C programming -8 weeks	Introduction To Soft Computing-8 weeks	Human Computer Interactions-8 weeks
2	Enhancing soft skill and personality – 8 wks	RDBMS Postgres SQL -6 weeks	Embedded System Design with ARM -8 weeks
3	Design and analysis of algorithms -8 weeks	Privacy and Security in Online Social Media -8 weeks	Introduction to Blockchain Technology and Applications-8 weeks
4	Linux (Spoken tutorial)	Employment Communication A Lab based course – 8 weeks	User –centric Computing for Human –Computer Interaction - 8 weeks
5	Soft Skill Development-8 weeks	PHP and MySQL (Spoken tutorial)	Introduction to Operations Research-8 weeks
6	Speaking Effectively -8 weeks	Scilab (Spoken tutorial)	Data Mining-8 weeks

** Institute may choose any one of suggested MOOC Course or decide any other MOOC course at Institute level.

II. Examination Scheme:
- The theory examination shall be conducted in two phases for all the subjects of semesters_1 to Semester_3.
- Phase I as Internal Continuous assessment of 30 marks for theory.
- Phase II as External Examination of 70marks for theory.
- For Semester_4 internal assessment of 150 marks and external assessment of 200 marks.

III. Structure of Question Paper:
- Marks weightage to be given for questions per unit is as –

TABLE -6. 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

- Paper will have **Two** sections. First section comprises Unit number 1,2,3 and Section II comprises unit 4,5,6 for each question there will be OPTIONAL Question based on same unit and of same marks.

IV. 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 subject 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.

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

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 mini 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 presentation in the term making use of audio/video aids for the duration of 30-35 minutes and submit two copies of the seminar report in a prescribed format provided by the host 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 at Final Year with Industrial Internship:
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.

G. Procedure for offering Open Elective:
Open elective proposal can be offered with Industry partner. A proposal with syllabus 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.

Total Credits = 80
Breakup of Credits –
1. For Semester I with 22 Credits, Semester II and III with 21 Credits making total of 64 Credits
2. For Semester IV which contains Seminar & Full time Project, 16 Credits.

V. Rules of Passing:
RV.1
To pass the Term Work / Practical / Oral/ presentation the student has to earn Minimum of 40 percent marks in each respective examination head.

RV.2
To pass the Theory Subject head the student has to earn minimum of 40 percent marks in External examination and 40percent marks in internal college evaluation. And together minimum passing should be 40 percent.

RV.3
The failing student can repeat the End-semester examination to pass the head in any semester and the Internal assessment marks will be retained as it is.

RV.4
To earn credits of a course (Theory/term work/practical/oral/presentation) student must pass the course with minimum passing marks/grade.

RV.5

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

VI. Rules of ATKT (Allowed To Keep Term):

RVI.1

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

RVI.2

A student will be awarded the degree if he/she earns 80 credits and successfully completes all the mandatory audit courses in respective semesters.

VII. Assessment and Grade Point Average:

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 internal 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 7. 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
NAC	-	-	Not Completed Audit Course
PP	-	-	Non Credit MOOC course completed
NP	-	-	Not completed Non credit MOOC course

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.
- F Grade -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.
- AC and NAC Grade -The student registered for auditing a course shall be awarded the grade AC after satisfactory completion of credit 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 NAC grade.

- PP and NP Grade - The student registered and completed non credit MOOC course shall be awarded the grade PP after satisfactory completion of credit 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 MOOC course will be awarded as NP grade.

- FX 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. Courses etc. shall be awarded PP/NP grades.

- The student with F / FX in a course shall not be awarded any credits for that course.

VIII. 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.

Semester Grade Point Average (SGPA) $= \dfrac{\sum_{i=1}^{p} CiGi}{\sum_{i=1}^{p} Ci}$

$$SGPA = \dfrac{\sum GradePointsEarned X CreditsForEachCourse}{TotalCredits}$$

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

$$SGPA = \dfrac{C1G1+C2G2+C3G3+C4G4+C5G5}{C1+C2+C3+C4+C5}$$

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 fourth semester for the students admitted in the First year. It is calculated in the same manner as the SGPA.
ln 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.

IX. 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 8.

Table 8. 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

X. References

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

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