

# **SATHYABAMA UNIVERSITY**

(Established under section 3 of UGC Act, 1956)

Jeppiaar Nagar, Rajiv Gandhi Salai, Chennai - 600 119.



## **SYLLABUS**

### **FACULTY OF BIO AND CHEMICAL ENGINEERING**

- BACHELOR OF TECHNOLOGY IN BIOINFORMATICS
- BACHELOR OF TECHNOLOGY IN BIOMEDICAL ENGINEERING
- BACHELOR OF TECHNOLOGY IN BIOTECHNOLOGY
- BACHELOR OF TECHNOLOGY IN CHEMICAL ENGINEERING

**REGULATIONS 2015**

# SATHYABAMA UNIVERSITY

## REGULATIONS – 2015

### CHOICE BASED CREDIT SYSTEM

Effective from the academic year 2015-2016 and applicable to the students admitted to the Degree of Bachelor of Engineering / Technology. (Eight Semesters)

#### 1. NOMENCLATURE

- **Programme** : Refers to the Bachelor of Engineering / Technology Stream that a student has chosen for study. Eg. B.E in Mechanical Engineering
- **Course** : Refers to the course (Subject) that a student would have to undergo during the study in the University
- **Batch** : Refers to the Starting and Completion year of a Programme of study. Eg. Batch of 2015–2019 refers to students belonging to a 4 year Degree programme admitted in 2015 and completing in 2019.
- **Faculty** : Each Programme and Department of the University is grouped under various Faculty. Eg. Faculty of Computing consists of Departments of Computer Science, Information Technology and Computer Applications. This Faculty offers various Undergraduate and Postgraduate Programmes in Engineering like B.E (Computer Science), B.Tech (Information Technology), M.E (Computer Science), M.Tech (Information Technology)
- **Faculty Head** : Refers to the Head of a Group of Departments under which various UG and PG Programmes are offered.
- **HoD** : Refers to the Head of a Department (HoD) offering various UG and PG programmes. He/She will be the Head of all staff members and Students belonging to the Department

#### 2. STRUCTURE OF PROGRAMME

2.1. Every Programme will have a curriculum with syllabi consisting of theory and practicals such as:

- (i) General Foundation courses comprising English, Mathematics, Basic Sciences and Engineering Sciences.
- (ii) Core courses belonging to the Major Programme of study.
- (iii) Electives offered by the Faculty and the Department related to the Major programme of study.
- (iv) University Electives to be chosen from a group of courses offered, which can be chosen by any student of any stream.
- (v) Laboratory courses such as Workshop practice, Computer Practice, Engineering Graphics, etc.
- (vi) Professional Training Courses during the semester vacation.
- (vii) Project Work

2.2. Each semester curriculum shall normally have a blend of lecture courses not exceeding 6 and practical courses not exceeding 2.

2.3. Each course is normally assigned certain number of credits as follows:

- **Lecture Hours (Theory)** : 1 credit per lecture hour per week, 1 credit per tutorial hour per week,
- **Laboratory Hours** : 1 credit for 2 Practical hours, 2 credits for 3 or 4 hours of practicals per week.
- **Project Work** : 1 credit for 2 hours of project work per week
- **Professional Training** : 5 credits for minimum of 3 weeks of training during summer vacations

2.4. The medium of instruction, examinations and project report will be in English Language throughout the Programme

2.5. For the award of the degree, a student has to earn the total number of credits as specified in the curriculum of the relevant branch of study.

### 3. DURATION OF THE PROGRAMME

A student is normally expected to complete the B.E/B.Tech. Programme in 8 semesters but in any case not more than 12 consecutive semesters from the time of commencement of the course (not more than 10 semesters for those who join 3rd semester under Lateral entry system) The Head of the Department shall ensure that every teacher imparts instruction as per the number of hours specified in the syllabus and that the teacher teaches the full content of the specified syllabus for the course being taught.

### 4. REQUIREMENTS FOR COMPLETION OF A SEMESTER

A candidate who has fulfilled the following conditions shall be deemed to have satisfied the requirement for completion of a semester.

4.1 He/She secures not less than 90% of overall attendance in that semester.

4.2 Candidates who do not have the requisite attendance for the semester will not be permitted to write the semester Examinations.

### 5. FACULTY HEAD

Each Faculty is headed by a Faculty Head which comprises of many Departments and Courses offered by them. The Faculty Head is responsible for all activities taking place inside the Faculty in coordination with all Department Heads and all staff members belonging to the faculty. The Faculty Head will be appointed by the University on rotational basis. The Faculty Head shall act as a linkage between the HoD's, faculty members and the students. The Faculty Head makes a review of all the academic activities of Staff, Students and Research on a regular time interval and takes steps to improve the morale of all staff and students.

### 6. HEAD OF THE DEPARTMENT

Each Department offering various UG and PG programmes is headed by a Head (HoD). The HoD is responsible for allotting courses to each staff member uniformly in consultation with other HoD's and Faculty Heads. The HoD is responsible for streamlined teaching of courses to students, improvement and Assessment of Teaching Quality within the Department on a continuous basis, Assessment of staff members, transparent conduct of Continuous Assessment Examinations, Interacting with Parents, ensuring that all academic and non academic activities of staff and students are monitored and steps taken for their improvement.

## 7. BATCH COORDINATOR

The Head of the Department shall appoint a Batch coordinator for each batch of students admitted in to a programme, throughout their period of study. The Batch coordinator shall act as a linkage between the HoD, faculty members and the students. The Batch coordinator gets information about the Syllabus coverage by the staff members, requirements of the students academically and otherwise, attendance and progress of the students from the respective Class Counselors. The Batch Coordinator also informs the students of the academic schedule including the dates of assessments and syllabus coverage for each assessment, weightage for each assessment, their Continuous assessment Marks and attendance % details before the commencement of End Semester examinations.

## 8. CLASS COUNSELOR

There shall be a class counselor for each class. The class counselor will be one among the teachers of the Department. He / She will be appointed by the HoD of the department concerned. The responsibilities for the class Counselor shall be:

- To act as the channel of communication between the HoD, Faculty Head, Batch Coordinator, Course Coordinator, staff and students of the respective class.
- To collect and maintain various statistical details of students.
- To help the Batch Coordinator in planning and conduct of the Classes.
- To monitor the academic performance of the students including attendance and to inform the Batch Coordinator.
- To take care of the students' welfare activities like industrial visits, Seminars, awards etc.

## 9. COURSE COORDINATOR FOR EACH COURSE

- Each theory course offered to more than one class or branch or group of branches, shall have a "Course coordinator" comprising all the teachers teaching the course, with one of the senior staff amongst them normally nominated as course coordinator, by the faculty head in consultation with the respective HoD's.
- The "Course Coordinator" shall meet the teachers handling the course, as often as possible and ensure a Common Teaching Methodology is followed for the course, Study materials are prepared by the staff members and communicated to the students periodically, involving students in course based projects and assignments, common question paper for continuous assessment tests, uniform evaluation of continuous assessments Answer sheets by arriving at a common scheme of evaluation.
- The Course coordinator is responsible for evaluating the Performance of the students in the Continuous Assessments and End Semester exams and analyse them to find suitable methodologies for improvement in the performance. The analysis should be submitted to the HoD and Faculty Head for suitable action.

## 10. EXAMINATIONS

The end semester examinations shall normally be conducted between October and December during the odd semesters and between March and May in the even semesters. The maximum marks for each theory and

practical course (including the project work and Viva Voce examination in the final Semester) shall be 100 with the following breakup.

**(i) Theory Courses**

Continuous Assessment : 50 Marks

End Semester Exams : 50 Marks

**(ii) For Practical courses**

Continuous Assessment : 50 Marks

End Semester Exams : 50 Marks

## 11. CONTINUOUS ASSESSMENT EXAMS

### a. Theory courses

- There will be a Minimum of two Continuous Assessment Exams, for each Theory course. Each Assessment Exam will be conducted for a Maximum of 50 Marks. The total marks secured in the Two Assessment Exams out of 100, will be converted to 45 Marks. The % -of attendance secured by the candidate in a course in a semester will carry a weightage of 5 Marks, which will be added to the Continuous Assessment Marks for each course.
- The Continuous assessment marks obtained by the candidate in the first appearance shall be retained and considered valid for all subsequent attempts, till the candidate secures a pass.

### b. Practical courses

- For Practical Courses, the student will be evaluated on a continuous basis for 25 Marks (which will include performing all experiments, submitting Observation and Record Note Book in scheduled Format and Time), 20 Marks for Model Exam at the end of the semester and 5 Marks for Attendance in the course.
- For Practical courses, if a student has been absent for some Practical Classes or has performed poorly, then the student will have to get permission from the Lab incharge and batch coordinator to do the experiments, so that he/she meets all the requirements for the course and thereby allowed to appear for Model and End Semester Exams.
- If a student has not done all the experiments assigned for that Lab, before the scheduled date or has attendance percentage less than 90%, the student will not be allowed to appear for the Model and end semester Practical Exam. Such students will have to redo the course again by doing all the experiments in the next semester when the course is offered.

## 12. ELECTIVE COURSES

Every student has the option of choosing four elective courses during the period of study. These electives will be offered in the Prefinal and Final year of study. The student has to select atleast two electives offered by the respective department. The student also has the choice of selecting the other two electives from electives offered by Departments within the faculty in that semester and / or from the University electives which can be opted as elective by all undergraduate branches of the University.

## 13. FINAL YEAR PROJECT WORK

- Project work is to be undergone by each student in the final year. The Project work has been divided in to two Phases (Phase 1 and 2). Project work Phase 1 is to be done in the Pre-final Semester and Phase 2 during the Final Semester.

- Project work may be allotted to a single or two students as a Group. In special cases, the number of students in a Project Group cannot exceed Three, if it can be justified by the Project Supervisor and HoD, that the Project Work Content is large enough.
- For Project work, Assessment is done on a continuous basis by 3 Reviews for 50 Marks and Final Viva voce carries 50 Marks.
- There shall be three Project Reviews (Conducted during the Pre-final semester and Final Semester) to be conducted by a review committee. The student shall make presentation on the progress made, before the committee. The Head of the Department shall constitute the review committee for each branch in consultation with Faculty Head. . The members of the review committee will evaluate the progress of the Project and award marks.

	PROJECT REVIEWS			UNIVERSITY PROJECT VIVA VOCE
	1	2	3	
Max. Marks	5	15	30	50

- The total marks obtained in the three reviews, rounded to the nearest integer is the Continuous Assessment marks out of 50. There shall be a viva-voce examination for University Semester Examination conducted by one internal examiner, one external examiner and the supervisor concerned.
- A student is expected to attend all the Project Reviews conducted by the University on the scheduled dates. It is mandatory for every student to attend the Reviews, even if they are working on a project in an industry based outside Chennai city. It is their duty to inform the organization about the project reviews and its importance, and get permission to attend the same. If a student does not attend any of the Project Reviews, he / she shall not be allowed for the successive reviews and thereby not allowed to appear for the Final viva voce.
- The University Project viva-voce examination shall carry 50 marks. Marks are awarded to each student of the project group based on the individual performance in the viva-voce examination. The external examiner shall be appointed by the Controller of Examinations. The Internal and External Examiner will evaluate the Project for 20 Marks each. The project report shall carry a maximum of 10 marks.
- The candidate is expected to submit the project report as per the guidelines of the University on or before the last day of submission. If a candidate fails to submit the project report on or before the specified deadline, he / she can be granted an extension of time up to a maximum limit of 5 days for the submission of project work, by the Head of the Department.
- If he / she fails to submit the project report, even beyond the extended time, then he / she is deemed to have failed in the Project Work and shall register for the same in the subsequent semester and re-do the project after obtaining permission from the HoD and Faculty Head.

#### 14. PASSING REQUIREMENTS

- A candidate should secure not less than 50% of total marks prescribed for the courses, subject to securing a minimum of 30% marks out of Max. Mark in End Semester Exams. Then he / she shall be declared to have passed in the Examination.
- If a candidate fails to secure a pass in a particular course, it is mandatory that he / she shall register and reappear for the examination in that course during the next semester when examination is conducted in that course. It is mandatory that he / she should continue to register and reappear for the examination till he / she secures a pass.

**15. AWARD OF GRADES**

All assessments of a course will be done on absolute marks basis. However, for the purpose of reporting the performance of a candidate, letter grades, each carrying certain number of points, will be awarded as per the range of total marks (out of 100) obtained by the candidate in each course as detailed below:

**RANGE OF MARKS FOR GRADES**

Range of Marks	Grade	Grade Points (GP)
90-100	A++	10
80-89	A+	9
70-79	B++	8
60-69	B+	7
50-59	C	6
00-49 (Reappear)	RA	0
ABSENT	AAA	0
Withdrawal	W	0
Authorised Break of Study	ABS	0

**CUMULATIVE GRADE POINT AVERAGE CALCULATION**

The CGPA calculation on a 10 Point scale is used to describe the overall performance of a student in all courses from first semester to the last semester. RA, AAA and W grades will be excluded for calculating GPA and CGPA.

$$CGPA = \frac{\sum_i C_i GP_i}{\sum_i C_i}$$

where  $C_i$  - Credits for the course

$GP_i$  - Grade Point for the course

$\sum_i$  - Sum of all courses successfully cleared during all the semesters

Final Degree is awarded based on the following:

- CGPA  $\geq$  9.0 - First Class - Exemplary
- CGPA  $\geq$  7.50 < 9.00 - First Class with Distinction
- CGPA  $\geq$  6.00 < 7.50 - First Class
- CGPA  $\geq$  5.00 < 6.00 - Second Class

Minimum requirements for award of Degree, a student should have obtained a minimum of 5.0 CGPA.

**16. GRADE SHEET**

After revaluation results are declared, Grade Sheets will be issued to each student which will contain the following details:

- Name of the Candidate with Date of Birth and Photograph.
- The programme and degree in which the candidate has studied
- The list of courses enrolled during the semester and the grade secured
- The Grade Point Average (GPA) for the semester.

**17. ELIGIBILITY FOR THE AWARD OF DEGREE**

A student shall be declared to be eligible for the award of the B.E/B.Tech. degree, provided the student has successfully completed all the requirements of the programme, and has passed all the prescribed examinations in all the 8 semesters within the maximum period specified in clause 3.

- i) Successfully gained the required number of total credits as specified in the curriculum corresponding to his/her programme within the stipulated time.
- ii) Successfully completed the programme requirements and has passed all the courses prescribed in all the semesters within a maximum period of 6 years (5 Years for Lateral Entry Candidates) reckoned from the commencement of the first semester to which the candidate was admitted.
- iii) Successfully completed any additional courses prescribed by the University.
- iv) No disciplinary action pending against the student.
- v) The award of Degree must have been approved by the Board of Management of the University.

**18. CLASSIFICATION OF THE DEGREE AWARDED**

1. A candidate who qualifies for the award of the Degree having passed the examination in all the courses of all the 8 semesters in his/her first appearance within a maximum of 8 consecutive semesters (maximum of 6 semesters for Lateral entry students who join the course in the third semester) securing a overall CGPA of not less than 9.0 (Calculated from 1<sup>st</sup> semester) shall be declared to have passed the examination in **First Class - EXEMPLARY**. Authorized Break of Study vide Clause 20, will be considered as an Appearance for Examinations, for award of First Class – Exemplary. Withdrawal from a course shall not be considered as an appearance for deciding the eligibility of a candidate for First Class – Exemplary
2. A candidate who qualifies for the award of the Degree having passed the examination in all the courses of all the 8 semesters in his/her first appearance within a maximum of 8 consecutive semesters (maximum of 6 semesters for Lateral entry students who join the course in the third semester) securing a overall CGPA of not less than 7.5 (Calculated from 1<sup>st</sup> semester) shall be declared to have passed the examination in **First Class with Distinction**. Authorized Break of Study vide Clause 20, will be considered as an Appearance for Examinations, for award of First Class with Distinction. Withdrawal shall not be considered as an appearance for deciding the eligibility of a candidate for First Class with Distinction.
3. A candidate who qualifies for the award of the Degree having passed the examination in all the courses of all the 8 semesters within a maximum period of 8 consecutive semesters (maximum of 6 semesters for Lateral entry students who join the course in the third semester) after his/her commencement of study securing a overall CGPA of not less than 6.0 (Calculated from 1<sup>st</sup> semester), shall be declared to have passed the examination in **First Class**. Authorized break of study vide Clause 20 (if availed of) or prevention from writing End semester examination due to lack of attendance will not be considered as Appearance in Examinations. For award of First class, the extra number of semesters than can be provided (in addition to four years for Normal B.E / B.Tech and 3 years for Lateral Entry) will be equal to the Number of semesters availed for Authorized Break of Study or Lack of Attendance. Withdrawal shall not be considered as an appearance for deciding the eligibility of a candidate for First Class.
4. All other candidates who qualify for the award of the Degree having passed the examination in all the courses of all the 8 semesters within a maximum period of 12 consecutive semesters (10 consecutive semesters for Lateral Entry students, who join the course in the third semester) after his/her commencement of study securing a overall CGPA of not less than 5.0, (Calculated from 1<sup>st</sup> semester) shall be declared to have passed the examination in **Second Class**.



5. A candidate who is absent in semester examination in a course/project work after having registered for the same, shall be considered to have appeared in that examination for the purpose of classification.
6. A candidate can apply for revaluation of his/her semester examination answer paper in a theory course, immediately after the declaration of results, on payment of a prescribed fee along with application to the Controller of Examinations through the HoD. The Controller of Examination will arrange for the revaluation and the result will be intimated to the candidate concerned through the Head of the Department. Revaluation is not permitted for practical courses and for project work.

## 19. WITHDRAWAL FROM EXAMINATIONS

- A candidate may, for valid reasons, (medically unfit / unexpected family situations) be granted permission to withdraw from appearing for the examination in any course or courses in any one of the semester examination during the entire duration of the degree programme.
- Withdrawal application shall be valid only if the candidate is otherwise normally eligible (if he/she satisfies Attendance requirements and should not be involved in Disciplinary issues or Malpractice in Exams) to write the examination and if it is made within FIVE days before the commencement of the examination in that course or courses and also recommended by the Faculty Head through HoD.
- Notwithstanding the requirement of mandatory FIVE days notice, applications for withdrawal for special cases under extraordinary conditions will be considered based on the merit of the case.
- Withdrawal shall not be considered as an appearance for deciding the eligibility of a candidate for First Class – Exemplary, First Class with Distinction and First Class.
- Withdrawal is NOT permitted for arrears examinations of the previous semesters.

## 20. AUTHORIZED BREAK OF STUDY

- This shall be granted by the University Management, only once during the full duration of study, for valid reasons for a maximum of one year during the entire period of study of the degree programme.
- A candidate is normally not permitted to temporarily break the period of study. However, if a candidate would like to discontinue the programme temporarily in the middle of duration of study for valid reasons (such as accident or hospitalization due to prolonged ill health), he / she shall apply through the Faculty Head in advance (Not later than the Reopening day of that semester) through the Head of the Department stating the reasons. He /She should also mention clearly, the Joining date and Semester for Continuation of Studies after completion of break of Study. In such cases, he/she will attend classes along with the Junior Batches. A student who availed break of study has to rejoin only in the same semester from where he left.
- The authorized break of study will not be counted towards the duration specified for passing all the courses for the purpose of classification only for First Class.
- The total period for completion of the programme shall not exceed more than 12 consecutive semesters from the time of commencement of the course (not more than 10 semesters for those who join 3rd semester under Lateral entry system) irrespective of the period of break of study in order that he / she may be eligible for the award of the degree
- If any student is not allowed to appear for University Examinations for not satisfying Academic requirements and Disciplinary reasons, (Except due to Lack of Attendance), the period spent in that semester shall NOT be considered as permitted 'Break of Study' and is NOT applicable for Authorized Break of Study.

- In extraordinary situations, a candidate may apply for additional break of study not exceeding another one Semester by paying prescribed fee for break of study. Such extended break of study shall be counted for the purpose of classification of First Class Degree.
- If the candidate has not reported back to the department, even after the extended Break of Study, the name of the candidate shall be deleted permanently from the University enrollment. Such candidates are not entitled to seek readmission under any circumstances.

## 21. PROFESSIONAL TRAINING

- Every student is required to undergo Industrial Visits during every semester of the Programme. HoDs shall take efforts to send the students to industrial visits in every semester.
- The students will have to undergo Professional training for a Minimum period of 3 weeks during the semester Holidays at the end of second year and Third Year respectively.
- This could be internship in a industry approved by the Faculty Head or Professional Enrichment courses (like attending Summer Schools, Winter Schools, Workshops) offered on Campus or in Registered Off Campus recognised Training Centres approved by the Faculty Head for a minimum period of 3 weeks.
- A report on Training undergone by the student, duly attested by the Coordinator concerned from the industry / Organisation, in which the student has undergone training and the Head of the Department concerned, shall be submitted after the completion of training. The evaluation of report and viva voce examination can be computed as per norms for the University Semester examination.
- The evaluation of training will be made by a three member committee constituted by Head of the Department in consultation with Batch Coordinator and respective Training Coordinator. A presentation should be made by the student before the Committee, based on the Industrial Training or Professional Enrichment undergone.

## 22. NON CREDIT COURSES

Every student has the opportunity to enroll in any of the following Non Credit Courses, during the programme. The student will have to register for the courses with the respective coordinator before the end of First Semester.

- National Cadet Corps (NCC)
- National Service Scheme (NSS)
- Youth Red Cross (YRC)
- SPORTS CONTRIBUTION: The student is involved in any sport and represents the University in Tournaments.
- PROFESSIONAL CLUBS: Any student can also involve in any of the Professional Clubs available in the University .

The above contribution should be completed by the end of sixth Semester (end of Pre-final year) as per the requirements. The Contribution and the Performance of the candidate, will be Printed in the Final Semester Grade sheet and Consolidate Grade Sheet under the Category "NON CREDIT COURSES" indicated as SATISFACTORY or NOT SATISFACTORY.

## 23. OPPORTUNITY TO GAIN EXPOSURE OUTSIDE THE UNIVERSITY

- This is facilitated by the "Centre for Academic Partnerships" of Sathyabama University consisting of a team of experienced faculty members involved in forging Partnerships with Leading Universities, Educational Institutions, Industrial and Research establishments in India and Abroad.

- A student can be selected, to get Professional Exposure in his/her area of Expertise in any Reputed Research Organization or Educational Institution of repute or any Universities in India and abroad.
- This is possible only with the List of Research Organizations, Educational Institutions in India and abroad approved by Sathyabama University.
- A student should have got a minimum of 6 CGPA without any arrears at the time of applying and at the time of undergoing such courses outside, to avail this facility.
- The student can have the option of spending not more than three to Six months in the Final year or Pre-final year of his/her Degree. During this period, the student can do his/her Project work or register for courses which will be approved by the Centre for Academic Partnerships (CAP), under the Guidance of a Project Supervisor who is employed in the Organization and Co-guided by a staff member from our University.
- Applications for the above should be submitted by the students to the Centre for Academic Partnerships (CAP), in the required format, with complete details of University, Courses and Equivalence Details and approved by the Faculty Head.
- The Centre will go through the applications and select the students based on their Academic Performance and enthusiasm to undergo such courses. This will be communicated to the Universities Concerned by the Centre.
- The performance of the student in the courses, registered in that Institute or University will be communicated officially to Centre for Academic Partnerships (CAP).
- The students who undergo training outside the University (either in India or Abroad) is expected to abide by all Rules and Regulations to be followed as per Indian and the respective Country Laws, and also should take care of Financial, Travel and Accommodation expenses.

#### **24. DISCIPLINE**

Every student is required to observe disciplined and decorous behaviour both inside and outside the University and not to indulge in any activity which will tend to bring down the prestige of the University. If a student indulges in malpractice in any of the University theory / practical examination, continuous assessment examinations he/she shall be liable for punitive action as prescribed by the University from time to time.

#### **25. REVISION OF REGULATIONS AND CURRICULUM**

The University may from time to time revise, amend or change the regulations, scheme of examinations and syllabi if found necessary.