

കൊച്ചി ശാസ്ത്ര സാങ്കേതിക സർവ്വകലാശാല
COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY

COCHIN UNIVERSITY P.O.
COCHIN - 682022
KERALA, S. INDIA

No.Conf.II/2941/2/2020 (11)



Dated: 15.01.2021

NOTIFICATION

In exercise of the powers conferred by Section 24(ii) read with Section 42(1) of the CUSAT Act 1986, the Academic Council at its meeting held on 08.07.2020 resolved to approve the revised Regulation and course structure of B.Tech in Instrumentation Technology offered at the Department of Instrumentation with effect from 2020 admissions as in Appendix.

The Syndicate at its meeting held on 21.12.2020 vide Item No.682.07 considered and resolved to approve the above decision of the Academic Council.

REGISTRAR

To

1. Dr. C.K. Aanandan, Dean, Faculty of Technology and Professor (Retd.), Department of Electronics, CUSAT, Kochi – 22.
2. Dr. Johny Issac, Chairman, Board of Studies in Instrumentation and Associate Professor, CUSAT, Kochi – 22
3. The Head, Department of Instrumentation, CUSAT, Kochi-22.
4. The Controller of Examinations/Joint Registrar (Exams/Academic)/ Deputy Registrar (Exam II)/Assistant Registrar (Academic).
5. Academic A,C/Exam. E,V/IRAA/Exam Confidential Sections
6. Day File/Stock File/File Copy

REGULATIONS AND CURRICULUM

**B. Tech. Degree Programme in Instrumentation Technology
Offered by Department of Instrumentation Under Faculty of
Technology**

(With effect from 2020 Admission)



**COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY
COCHIN – 682 022**

Regulations for the B. Tech. degree programme in Instrumentation Technology offered by Department of Instrumentation under Faculty of Technology

The following regulations are made applicable to the B Tech. programme in Instrumentation Technology offered by The Department of Instrumentation, Cochin University of Science and Technology, under Faculty of Technology with effect from the academic year 2020 - 21.

1. Admission requirements

Candidates seeking admission to the B. Tech Degree program in Instrumentation technology shall be required to possess the following qualification.

- 1.1 The candidate shall have passed the plus two (12th) examination of any state/national board with Mathematics, Physics and Chemistry as optional subjects or any other examination accepted as equivalent by the Cochin University of Science and Technology.
- 1.2 The candidate shall have secured a minimum of 50% marks in Mathematics and 50% marks in Mathematics, Physics and Chemistry put together.
- 1.3 Relaxations in marks shall be followed for candidates belonging to SC/ST and socially and educationally backward classes as prescribed by the University.
- 1.4 The candidates shall also satisfy the conditions regarding physical fitness as may be prescribed by the University.
- 1.5 Admission to the course shall be through Common Admission Test (CAT) conducted by the University every year and admission will be based on the rank in the admission test. If a candidate, after getting admission based on his/her CAT rank, fails to meet the admission requirements as specified in clause 1.1, 1.2 and 1.3 above before commencement of the first semester examination, he/she shall be terminated from continuing the course.
- 1.6 10% additional seats may be created in a batch in the third semester for lateral entry. Candidates seeking admission through lateral entry shall have 3 years diploma in Instrumentation or Electronics awarded by a board recognized by the department of technical education, Govt. of Kerala, with not less than 60% marks. Maximum age limit will be 25 years as on 1st July of the academic year.

2. Duration of the course

The duration of the B Tech. programme shall be eight semesters spanning over four academic years as prescribed in the curriculum. Each semester shall consist of a minimum of 16 weeks.

3. Course Registration

It is mandatory for the students to register for the courses in each semester.

- 3.1 Before registration, the students should clear all dues including any fees to be paid and

should not have any disciplinary issues pending

3.2 The Department will announce the dates for registration in its academic calendar. Late registration will be allowed up to 7 working days from the commencement of the semester with late registration fee.

4. Mode of Evaluation

4.1 The performance of the students in theory courses will be evaluated based on continuous assessment and semester end examination. In the case of laboratory courses, the evaluation will be based on continuous assessment and semester end assessment, which will be carried out internally.

4.2 For theory courses, there will be 50% weightage for internal assessment and 50% weightage for semester end examination. For practical courses, continuous assessment and semester end assessment will carry 50% weightage each.

4.3 For theory courses, the assessment pattern will be as follows:

Continuous assessment:

- | | | | |
|----|------------------------|---|-------------------|
| a) | First periodical test | - | Maximum marks: 15 |
| b) | Second periodical test | - | Maximum marks: 15 |
| c) | Assignments | - | Maximum marks: 15 |
| d) | Attendance | - | Maximum marks: 5 |

Semester End Examination

- a) Examinations shall be of 3 hours duration.
- b) Maximum marks: 50

4.4 For laboratory courses, the assessment pattern will be as follows:

Continuous Assessment:

The marks may be awarded on the basis of the performance of the student in the laboratory sessions. The break-up of marks for continuous assessment of laboratory courses shall be:

- | | | | |
|----|---------------------------|---|------------------------|
| a) | Practical records/Outputs | - | Maximum weightage: 20% |
| b) | Lab work | - | Maximum weightage: 30% |

Semester end assessment:

The semester end assessment will consist of an examination and a viva voce. Maximum weightage for semester end examination: 50%

4.5 At the end of the semester, semester examination will be conducted in all the theory

courses offered in that semester and they will be of three hours duration unless otherwise specified. The Controller of Examinations will make necessary arrangements for setting the question papers and valuation of answer books for the semester end examination of theory courses.

- 4.6 The department shall conduct the semester end assessment for the laboratory courses internally with at least two faculty members as examiners.
- 4.7 In the case of project work, the project guide concerned shall make the continuous assessment. A committee consisting of the Project Coordinator (nominated by the Head of the Department), project guide, and at least one senior faculty member at the level of Associate Professor or above will carry out the assessment of the project report and final review.

The weightage for the assessment of project work shall be as follows:

Continuous assessment	: 40 percent
Project report	: 20 percent
Final review	: 40 percent

- 4.8 The Viva-voce examination at the end of VIII semester will be conducted by a panel of minimum three examiners consisting of the Head of the Department or his/her nominee and two or more faculty members with one senior faculty at the level of Associate Professor or above of the Department.
- 4.9 A candidate shall not be allowed to improve the continuous assessment marks in theory/laboratory courses. A candidate who desires to improve his/her marks in the semester end examination in theory courses shall be permitted to do so in the next available chance. This facility will be available only once for a theory course.
- 4.10 For industry elective courses, the evaluation will be done jointly by the resource persons from the industry who handles the course and the faculty in charge of the course.

5. Course Completion and Earning of Credits.

Students registered for a course have to attend the course regularly and meet the attendance rules of the University and appear for all the internal evaluation procedures for the completion of the course. However, credits can be earned only on completion of the semester end examination and on getting a pass grade. Students, who have completed a course, but could not write the semester end examination for valid reasons, are permitted to write the examination at the next available chance and earn the credits without undergoing the course again.

6. Eligibility to Appear for the Semester End Examination

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

- 6.1 A student shall secure not less than 75% of overall attendance in a semester taking into account the total number of periods in all courses attended by the candidate as against the total number of periods in all courses offered during that particular semester.

- 6.2 The Head of the Department shall have the power to condone shortage of attendance up to 5% (between 75% and 70%) in a particular semester due to medical reasons (hospitalization/accident/specific illness) on production of medical certificate from a registered medical practitioner endorsed by the University Medical Officer and on payment of the required fee. However, such condonation for shortage of attendance shall be given only twice during the entire duration of the B Tech. programme.
- 6.3 The Vice Chancellor shall have the power to condone shortage of attendance up to additional 5% (between 70% and 65%) in a particular semester due to medical reasons (hospitalization/accident/specific illness) duly verified and recommended by the Head of the Department and on production of Medical certificate from a registered medical practitioner endorsed by the University Medical Officer and on payment of the required fee. However, such condonation for shortage of attendance shall be given only twice during the entire duration of the B Tech. programme.
- 6.4 Candidates who secure overall attendance of less than 65% (subject to clauses 6.2 and 6.3 above) will not be permitted to write the semester end examinations and will not be permitted to go to next/subsequent semester. They are required to repeat the incomplete semester in the next academic year.

7. Eligibility to Write the Supplementary Examination

Failed candidates and those who could not write the semester end examination due to health reasons or other contingencies that are approved by the Head of the Department can register for the supplementary examination. Those who wish to improve their performance in the semester end examinations can also register for the same, subject to the provisions of clause 4.9. Grades awarded in the supplementary examination will be taken as semester grades in these subjects and will be based on the semester examination-grading pattern in that subject. In the case of candidates appearing for improvement of marks, the higher mark obtained will be considered for the purpose of grading.

A candidate who fails to obtain a pass in courses having only continuous assessment will be permitted to repeat the course along with the junior batches.

8. Revaluation

A candidate can apply for revaluation of his/her semester end examination answer paper in a theory course, within 2 weeks from the declaration of results, on payment of a prescribed fee along with prescribed application to the Controller of Examinations through the Head of Department. The Controller of Examination will arrange for the revaluation and the results will be intimated to the candidate concerned through the Head of the Department. Revaluation is not permitted for laboratory courses, courses having only continuous assessment, seminar and project work.

9. Pass Requirements

A candidate has to obtain a minimum of 50% marks for continuous assessment and semester end examination put together with a minimum of 40% marks in the semester end examination for a pass in theory and laboratory courses.

In the case of theory/laboratory courses having only continuous assessment, a candidate has to obtain a minimum of 50% marks in continuous assessment for a pass.

10. Promotion to Higher Semesters

10.1 A candidate shall be eligible for promotion from one semester to the next semester only if he/she has

- a) A valid registration for the university examination
- b) Secured the minimum attendance as per Clause 6

10.2 Supplementary university examinations for all semesters shall be held along with the regular examinations.

10.3 Special supplementary examination may be conducted for the seventh and eighth semesters.

10.4 Total number of chances to appear for the examination in any subject is limited to five only.

11. Eligibility for the Degree

11.1 No candidate shall be eligible for the degree, unless he/she has undergone the prescribed course of study for a period of eight semesters in the university and has passed the prescribed examinations in all the semesters.

11.2 All the requirements for the degree shall be completed by the candidate within a period of eight academic years from the date of admission to the first semester.

12. Grading

12.1 Grades shall be awarded to the students in each course based on the total marks obtained in continuous assessment and at the end semester examination and as per the provisions of clause 4.

The grading pattern shall be as follows:

Marks obtained (Percentage)	Grade	Grade points
90 to 100	S (Outstanding)	10
80 – 90	A (Excellent)	9
70 – 80	B (Very good)	8
60 – 70	C (Good)	7
50 - 60	D (Fair)	6
< 50	F (Fail)	0

Note: Where X – Y range denotes ‘X’ inclusive and ‘Y’ exclusive

12.2 A student is considered to have credited a course or earned credits in respect of a course if he/she secures a grade other than F for that course.

12.3 Grade Point Average.

The Grade Point Average (GPA) indicates the academic performance of a student in a semester.

$$\text{GPA} = \frac{G_1C_1 + G_2C_2 + \dots + G_nC_n}{C_1 + C_2 + \dots + C_n},$$

where ‘G’ refers to the grade point and ‘C’ refers to the credit value of the corresponding course undergone by the student.

The Grade Point Average (GPA) for each semester will be calculated only for those students who have passed all the registered courses of that semester. Similarly, Cumulative Grade Point Average (CGPA) up to any semester will be calculated only for those students who have passed all the courses up to that semester.

12.4 Classification:

On successful completion of the program Cumulated GPA (CGPA) will be calculated as follows

$$\text{CGPA} = \frac{GP_1C_1 + GP_2C_2 + \dots + GP_8C_8}{C_1 + C_2 + \dots + C_8},$$

where GP_n refers to the GPA and C_n refers to the total number of credits obtained by a student in Semester n .

The classification based on CGPA is as follows

CGPA 8 and above	: First Class with distinction
CGPA 6.5 and above, but less than 8	: First Class
CGPA 6 and above, but less than 6.5	: Second Class.

12.5 Conversion of CGPA to Percentage marks

The following formula shall be used to convert the CGPA obtained by a student to percentage marks.

$$\text{Percentage marks} = (\text{CGPA} - 0.5) \times 10$$

13 Electives and Open courses

The curriculum for the programme consists of Professional Elective Courses, and open courses. In addition, industry based elective courses shall be offered for students as part of the curriculum. A student shall have the choice of taking upto 20% of credit allotted to electives from such industry

base elective courses. Three open elective courses are offered in the final semester. The students shall select these courses from the list of courses available from approved national agencies such as SWAYAM, subjected to the approval of the department faculty council. The students are responsible to pay the course fee, if any, attend these online courses, pass the exam and produce the certificate. The percentage of marks/credit will be given according to the marks obtained in the above examination.

14. Faculty Advisor

To help the students in planning their courses of study and for general advice on the academic programme, the Head of the Department will attach a teacher of the Department to each batch of students, this teacher will be the Faculty Advisor for that batch of students throughout their period of study. These Faculty Advisors shall advise the students and monitor the courses taken by the students, check the attendance and progress of the students and counsel them periodically. If necessary, the Faculty Advisor may also discuss with or inform the parents about the progress/performance of the students concerned.

15. Class Committee

A class committee consists of teachers of the class concerned, student representatives and a chairperson who does not handle any subject for the class. It is like the 'Quality Circle' (more commonly used in industries), with the overall goal of improving the teaching- learning process. The functions of the class committee include:

- a. Solving problems experienced by students in the classroom and in the laboratories in consultation with Head of the Department.
- b. Clarifying the regulations of the degree programme and the details of rules therein.
- c. Informing the student representatives, the academic schedule including the dates of assessments and the syllabus coverage for each assessment.
- d. Informing the student representatives, the details of regulations regarding weightage used for each assessment.
- e. Analyzing the performance of the students of the class after each test and finding ways and means of improving the performance of the students.
- f. Identifying the students who are low achievers or weak in their subjects if any, and requesting the teachers concerned to provide some additional help or guidance or coaching to such students.

The Head of the Department will constitute the class committee. The class committee shall be constituted within a week from the date of commencement of a semester. At least 4 student representatives from the respective class (usually 2 boys and 2 girls) shall be included in the class committee. The student representatives shall be nominated on the basis of their academic performance since the first semester of the B Tech. programme. In the case of first and second semesters, the rank obtained in the Common Admission Test (CAT) shall be the criterion for nominating the student representatives. The Chairperson of the class committee may invite the Faculty Advisor(s) and the Head of the Department to the meeting of the class committee. The Chairperson of the class committee is required to prepare the minutes of every meeting, submit the same to the Head of the Department within two days of the meeting and arrange to circulate the same among students concerned and teachers. If there are some points in the minutes

requiring action by the University, the same shall be brought to the attention of the Head of the Department and the Registrar.

The first meeting of the class committee shall be held within fifteen days from the date of commencement of the semester. The nature and weightage of internal assessments shall be decided in the first meeting, within the framework of the regulations and the same shall be communicated to the students. Two or three subsequent meetings in a semester may be held at suitable intervals. During these meetings the student members representing the entire class, shall meaningfully interact and express their opinions and suggestions of the class to improve the effectiveness of the teaching-learning process.

16. Discipline

Every student is required to observe discipline and decorous behaviour both inside and outside the campus and refrain from any activity, which may tarnish the image of the University as per the provisions of the Cochin University Students' (Conduct and Disciplinary) Code - 2005. Any act of indiscipline, misbehaviour including unfair practice in examinations will be referred to the authorities of the University that will make a detailed enquiry on the matter and decide on the course of action to be taken.

17. Amendment to Regulations

Notwithstanding all that has been stated above, the University has the right to modify any of the above regulations from time to time.

18. Course Structure and Scheme of Evaluation.

The programme of instruction will consist of the following:

- a) Basic Science Courses (BSC) comprising Mathematics, Physics, Chemistry etc;
- b) Engineering Science Courses (ESC) introducing the student to the foundations of engineering.
- c) Professional Core Courses (PCC) introducing the students to the foundations of Instrumentation and Control engineering.
- d) Elective Courses (EC) enabling the student to opt and undergo a set of courses of interest to him/her;
- e) Professional practice including project, seminar, and industrial training;
- f) Humanities courses (HC) on soft skills; and
- g) Mandatory Courses (MC) on Indian Constitution and Environmental Science, in addition to Induction training.

The B Tech. programme will have a curriculum and syllabus for the courses approved by the Academic Council.

The B Tech. programme will follow the credit system.

The curriculum of the B Tech. programme has a total of 160 credits.

SEMESTER I

Course category	Course Code and Title of the Course	Hours per week			Credit	Evaluation		
		L	T	P		Int.	Ext.	Total
BSC	20-211-0101 Calculus	3	1	0	3	50	50	100
BSC	20-211-0102 Engineering Physics	3	1	0	3	50	50	100
ESC	20-211-0103 Basic Electronics	3	1	0	3	50	50	100
ESC	20-211-0104 Electrical Engineering - I	3	1	0	3	50	50	100
ESC	20-211-0105 Mechanical Engineering	3	1	0	3	50	50	100
HSC	20-211-0106 Soft Skill Development	1	1	0	1	100		100
HSC-L	20-211-0107 Language Lab	0	0	1	1	50		50
ESC-L	20-211-0108 Engineering Graphics	1	0	3	2	100		100
ESC-L	20-211-0109 Electrical and Mechanical Workshop	0	0	3	1	50		50
MC	Induction Training				0			
MC	Indian Constitution				0			

Total Credits: 20.**Total marks: 800**

SEMESTER II

Course category	Course Code and Title of the Course	Hours per week			Credit	Evaluation		
		L	T	P		Int.	Ext.	Total
BSC	20-211-0201 Linear Algebra and Transforms	3	1	0	3	50	50	100
ESC	20-211-0202 Engineering Chemistry	3	1	0	3	50	50	100
ESC	20-211-0203 Analog Electronics	3	1	0	3	50	50	100
ESC	20-211-0204 Electrical Engineering II	3	1	0	3	50	50	100
ESC	20-211-0205 Engineering Mechanics	3	1	0	3	50	50	100
BSC	20-211-0206 Materials Science	3	1	0	3	50	50	100
ESC-L	20-211-0207 Computer Programming	1	1	1	2	100		100
ESC-L	20-211-0208 Basic Electronics Lab	0	0	3	1	100		100
MC	Environmental Science				0			

Total Credits: 21.**Total marks: 800**

SEMESTER III

Course category	Course Code and Title of the Course	Hours per week			Credit	Evaluation		
		L	T	P		Int.	Ext.	Total
BSC	20-211-0301 Complex Analysis and Partial differential Equations	3	1	0	3	50	50	100
ESC	20-211-0302 Electrical and electronic Instruments	3	1	0	3	50	50	100
ESC	20-211-0303 Digital electronics	3	1	0	3	50	50	100
PCC	20-211-0304 Linear Integrated Circuits	3	1	0	3	50	50	100
PCC	20-211-0305 Transducers - I	3	1	0	3	50	50	100
PCC	20-211-0306 Principles of measurements and Instrumentation	3	1	0	3	50	50	100
ESC-L	20-211-0307 Analog Electronics Lab	0	0	3	1	100		100
ESC-L	20-211-0308 Electrical Machines Lab	0	0	3	1	100		100

Total Credits: 20**Total Marks: 800**

SEMESTER IV

Course category	Course Code and Title of the Course	Hours per week			Credit	Evaluation		
		L	T	P		Int.	Ext	Total
BSC	20-211-0401 Numerical and Statistical Methods	3	1	0	3	50	50	100
PCC	20-211-0402 Transducers - II	3	1	0	3	50	50	100
PCC	20-211-0403 Control Engineering -I	3	1	0	3	50	50	100
PCC	20-211-0404 Power Electronics	3	1	0	3	50	50	100
PCC	20-211-0405 Pneumatics and Hydraulics	3	1	0	3	50	50	100
ESC	20-211-0406 Signals and Systems	3	1	0	3	50	50	100
PCC-L	20-211-0407 Digital Electronics Lab	0	0	3	1	100		100
PCC-L	20-211-0408 Material science Lab	0	0	3	1	100		100

Total Credits: 20**Total Marks: 800**

SEMESTER V

Course category	Course Code and Title of the Course	Hours per week			Credit	Evaluation		
		L	T	P		Int.	Ext.	Total
PCC	20-211-0501 Control Engineering II	3	1	0	3	50	50	100
PCC	20-211-0502 Digital Signal Processing	3	1	0	3	50	50	100
PCC	20-211-0503. Microprocessors & micro controllers	3	1	0	3	50	50	100
PCC	20-211-0504 Analytical Instruments	3	1	0	3	50	50	100
HSC	20-211-0505 Engineering Management	3	1	0	3	50	50	100
EC	20-211-0506 Elective - I	3	1	0	3	50	50	100
PCC-L	20-211-0507 Control Systems Lab	0	0	3	1	100		100
PCC-L	20-211-0508 Transducer Lab	0	0	3	1	100		100

Total Credits: 20**Total Marks: 800**

SEMESTER VI

Course category	Course Code and Title of the Course	Hours per week			Credit	Evaluation		
		L	T	P		Int	Ext	Total
PCC	20-211-0601 Vacuum and cryogenic Instrumentation	3	1	0	3	50	50	100
PCC	20-211-0602. Embedded Systems	3	1	0	3	50	50	100
PCC	20-211-0603 Process Control-I	3	1	0	3	50	50	100
PCC	20-211-0604 Optoelectronic Instrumentation	3	1	0	3	50	50	100
EC	20-211-0605 Elective II	3	1	0	3	50	50	100
EC	20-211-0606 Elective III	2	1	0	2	50	50	100
PCC-L	20-211-0607 Microprocessor Lab	0	0	3	1	100		100
PCC-L	20-211-0608 Industrial Instrumentation Lab	0	0	3	1	100		100
	20-211-0609 Mini project	0	0	1	1	50		

Total Credits: 20**Total marks: 800**

SEMESTER VII

Course category	Course Code and Title of the Course	Hours per week			Credit	Evaluation		
		L	T	P		Int.	Ext.	Total
PCC	20-211-0701 Biomedical Instrumentation	3	1	0	3	50	50	100
PCC	20-211-0702 Process control II	3	1	0	3	50	50	100
PCC	20-211-0703 Power plant & Industrial Instrumentation	3	1	0	3	50	50	100
PCC	20-211-0704 Communication Systems and Telemetry	3	1	0	3	50	50	100
PCC	20-211-0705 Robotics and automation	3	1	0	3	50	50	100
EC	20-211-0706 Industry Elective	2	1	0	3	50	50	100
PCC-L1	20-211-0707 Process control Lab	0	0	3	1	100	-	100
PCC-L	20-211-0708 Virtual Instrumentation Lab	0	0	3	1	100	-	100
	20-211-0709 Seminar	0	0	1	1	50		50

Total Credits: 21**Total marks: 850**

SEMESTER VIII

Course category	Course Code and Title of the Course	Hours per week			Credit	Evaluation		
		L	T	P		Int.	Ext.	Total
EC	20-211-0801 Open Course 1	-	-	-	2			100
EC	20-211-0802 Open Course 2	-	-	-	2			100
EC	20-211-0803 Open Course 3	-	-	-	2			100
	20-211-0804 Project work	-	-	-	10	300	-	300
	20-211-0805 Viva- Voce	-	-	-	2	150	-	150

Total Credits: 18**Total Marks: 750****Program total:****Credits: 160****Marks: 6400**

