

**Department of Chemical Technology,
North Maharashtra University, Jalgaon**

**Credit Structure and Examination Rules for B. Tech. (Chem. Engg. /
Chem. Tech.) Courses of Studies w.e.f. July 2009**

Requirement of CREDIT SYSTEM

In tune with the concepts and suggestions of the AICTE, UGC and NAAC, Bangalore and technological advancements and societal needs and to make the teaching effective and meaningful, the university has adopted Cumulative Grade Point Average (CGPA) system for following B. Tech. and M. Tech. courses being run by the Department on regular basis.

Department of Chemical Technology provides Chemical Engineering and Technology education to produce quality engineer. The curriculum is designed to provide extensive and intensive knowledge, besides building a temper for the life long process of learning. At the undergraduate level, a student is required to do compulsory foundation courses in the areas of basic sciences, engineering sciences, humanities and management apart from departmental courses. Departmental courses (core and electives) constitute at least 50% of the total curriculum. Further, students are required to study open category electives to develop broad inter-disciplinary knowledge base in an area outside his/ her parent discipline. At the postgraduate level, students are encouraged to look beyond their area of specialization to broaden their horizons through open electives.

Programmes offered:

UG programmes (B. Tech.)

Name of Programme	Code
1. Chemical Engineering	CHE
2. Chemical Technology (Plastics Technology)	PL
3. Chemical Technology (Paints Technology)	PT
4. Chemical Technology (Oil Technology)	OT
5. Chemical Technology (Food Technology)	FT

PG programmes (M. Tech.)

Name of Programme	Code
1. Chemical Engineering	CHE
2. Polymer Technology	PT

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The codes of divisions are shown by two/three letters which are given below.

Name of the Division	Code
1. Chemical Engineering	CHE
2. Chemical Technology	CHT
i. Plastics Technology	PL
ii. Paints Technology	PT
iii. Oil Technology	OT
iv. Food Technology	FT
3. Engineering Sciences	ES
4. Basic Sciences	BS
5. Humanities and Management	HM

1. The medium of instruction in the department is English.
2. The department follows the semester system. An academic year runs from July to June next year and is comprised of two semesters. Typically, the 1st semester starts in the 1st week of July and ends in the 1st week of November; the 2nd semester starts in the 2nd week of December and ends in the 2nd week of April.

Academic calendar showing dates of commencement and end of teaching, internal assessment tests and term end examination shall be duly notified before commencement of each semester every year by the School/ Department. The academic calendar and the examination schedule shall be independent for the Department running CGPA pattern. The External Examinations for all the terms shall be conducted at the end of the term (i. e. after 13 weeks of teaching session / contact period).
3. Each Division will constitute Division Course Committee headed by Course Coordinator. Paper Setting, and Assessment for External Examinations shall be carried out partially by the Department / School and partly Externally; the exact ratio of External /Internal Setting & Evaluation shall be decided by the individual Course Coordinator, and Head of the Department . The appointment of Examiners shall be carried as per University norms.
4. The students of B. Tech. Course will have to attend 80 % of lectures, practical and any other term work as prescribed by the university. The conduct and behavior of the student must satisfy the Head of the Department/ Director of School.
5. The Head of the Department will certify that the student has attended the course as prescribed and has conducted himself satisfactorily. In absence of such certificate, the student shall not be permitted to appear for the University Examination.
6. The student shall have to appear personally to all parts of the examination.
7. Student will be allowed to take admission in subsequent semester provided his/ her term is granted in previous semester. However, the Student will not be allowed to submit his/ her 4th Semester Major Project Thesis unless he/she clears all previous Semester Examinations.

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The modalities and operational details of the credit system

1. Each theory subject of 4hr per week teaching will consists of 4 credits, as the credits shall be awarded in the terms of 1credit for 1hr per week per semester teaching load of theory paper of Bachelor's degree courses being run in Departments. One credit for practical course shall be awarded to the 2 hours of laboratory exercise for a semester. Practical course other than 2 hr per week shall be awarded credits in the ratio of 1:2 hr per week allotted to the course. Student shall has to register for the courses prescribed for the particular semester.

2. The weightage of tests (%) will be as follows on awarding the credits as approved by the Departmental Course Committee

Term end examination (Major Test)	60
Two Minor Tests	40
Total	100

3. Two minor tests (20 marks of each) will be conducted by the subject teacher while Major Examination of 60 marks will be partly based on External Paper Setting/ Assessment as decided by Course Coordinator, and Head of the Department. Departmental Internal Assessment Committee will coordinate Internal Examination Activity. It is mandatory to show the answer sheets of all tests (Internal and External) to the students. The marks for each test will be displayed on the notice board within seven days of conducting the test. The first minor test will be conducted after 4 weeks from starting of the semester. There will be flexibility in distribution of internal marks on the basis of regularity, sincerity, punctuality of the student as per the requirement of the course and mode of conduction of internal examination.

Term End Major Examination: - The term end major examination for 60 marks per course would be held about two weeks after completion of teaching for the semester. Each theory paper of 60 marks shall be of three hours duration and each theory paper of 30 marks shall be of 2 hours duration. Paper setting and assessment for a particular course would be the responsibility of the course Coordinator, and would be conducted partly by appointment of External Examiners and rest through Department. These activities, including preparation of the result-sheets for the students, would be coordinated by the Department Assessment Committee comprising Course Coordinator and HOD.

On the basis of total of marks obtained in Internal and Term End Examination, Credit Grade Points will be given to the students which will be approved by the Departmental Course Committee followed by submission to the Controller of Examination.

4. **Practical Courses:** Practical courses will be evaluated on the basis of each practical performed by student. Internal Marks (40%) for practical will be based on average assessment of at least 10 practical per course by the faculty conducting the practical in consultation with the Course in-charge. Major Examination of 60 % marks will be partly based on External Assessment as decided by Course Coordinator, and Head of

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the Department. The total marks allotted will be recalculated and converted in to credit grade point.

- 5. Seminar/ Field Work Components:** Five credits based on each Seminar/field work component/ Industrial Training will constitute the compulsory part. There will be a continuous evaluation of the seminar, preparation of the seminar and/or fieldwork. The evaluation will be based on following four heads:

Heads	Marks	Evaluating Authority
Performance of the student in the Collection of reference material for seminar/in the field	20	By faculty members involved in conducting seminar/tour
Punctuality, enthusiasm, and aptitude of students in preparing seminar/completing the report	20	By faculty
Performance in Seminar/Tour report	40	By External Referee
Viva-voce	20	By External Referee

The marks out of 100 will be computed to 5 credits for the purpose of grades.

6. Research Project: Student shall have to do research project/ Industrial training for one semester. The student shall submit neatly bound and typed thesis. The findings of Research Project will be examined by External Referee (For the purpose of Appointment of Referee, Panel of Eminent Experts in relevant field will be constituted by Department Assessment Committee) and Project Guide.

Grade Point Calculations

- (i) **Grades** - Marks for each course would be converted to grades as shown in Table 1.

Table 1: Conversion of marks to grades in credit system

Qualification	Grade	Points	% points of Max. Marks
Outstanding	O	10	90 & Above
Excellent	E	9	80-89
Very Good	A	8	65-79
Good	B	7	55-64
Satisfactory	C	6	45-54

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Fair	D	5	40-44
Fail	F	0	Less than 40

To judge the overall performance, one considers cumulative Grade Point Average as the criterion. CGPA Calculation is as illustrated below:

CGPA Calculation System

SGPA: Semester grade point average

CGPA: Cumulative grade point average

Point: (a) Integer average of each letter grade

Credit: (b) Integer signifying the relative emphasis of Individual Course item(s) in a semester as indicated by the course structure and syllabus.

Credit Point: (b) times (a) for each course item

Credit Index: CREDIT POINT of course items in semester

GRADE POINT: CREDIT INDEX divided by CREDITS

AVERAGE SGPA: CREDIT INDEX for a semester divided by CREDITS in a Semester

CGPA: CREDIT INDEX of all previous semesters divided by CREDITS of all previous semesters.

- i) For the purpose of Passing in individual papers, student must secure at least 40 % in university term end examination and at least D grade (40%) on the basis of total of marks obtained in Internal and External Examinations of individual papers. Student must appear in all examinations.
- ii) A student who passes the minor tests ($\geq 40\%$) but fails in Term End Examination i.e. ($< 40\%$), the student shall be given F grade. Student with F grade in a Paper would be granted credit for that Paper but not the grade for that Subject.
- iii) The student shall be admitted in third year provided he/ she has passed successfully in first year. Similarly, the student shall be admitted in fourth year provided he/ she has passed successfully in second year. Prevailing rules of ATKT for Faculty of Engg. and Tech. shall be applicable for grant of term to the student.

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- iv) The B. Tech. course must be completed within seven years period of time from the date of admission to first B. Tech. and within six years for students taking direct admission in second year.
- v) For improvement of the grade point a student can opt more elective(s).
- vi) Student will not be allowed to submit his/ her Major Project Thesis unless he/ she clears all previous Semester Examinations i.e. grades better than D.

7. Final Result: For the final result of a student, Cumulative grade point average (CGPA) based on total earned credits vis-à-vis total earned grade points shall be calculated. The SGPA and CGPA shall be calculated as-

$$\text{SGPA} = \frac{\text{Sum of earned grade points during Semester}}{\text{Sum of credits of Semester}}$$

$$\text{CGPA} = \frac{\text{Sum of total earned grade points}}{\text{Sum of total credits}}$$

As an example,

Course number	Credits Obtained	Marks	Grade	Grade Point	Earned Grade Points
BSxxx	4	87/100	E	9	36
ESxxx	4	55/100	C	6	24
CHExxx	2	24/50	D	5	10

SGPA = Earned grade points in the semester / Total credits of the courses in the semester;
 $70/10 = 7$

CGPA = Total of SGPA of all semesters / Number of semester i.e.

Sem- I	7.0
Sem,-II	8.5
Sem.-III	9.6
Sem.-IV	9.4
Total 4	34.5 = 8.62

The final grade earned shall be as per Table 2 given below.

Table 2

Qualification	Final Grade	CGPA
Outstanding	O	9.0 -10
Excellent	E	8.0- 8.9
Very Good	A	6.5-7.9
Good	B	5.5-6.4
Satisfactory	C	4.5-5.4
Fair	D	4.4-4.0
Fail	F	0-4

- i) For overall passing of B. Tech. Course, CGPA of at least 4.5 is considered satisfactory. The student thus will be declared eligible for award of B. Tech. degree if and only if the student receives at least CGPA of 4.5.
- ii) If the student is unable to secure CGPA of 4.5, then the student will have to appear in all courses/ papers in which the student has secured D and F grade.

Nomenclature of the courses

First two letters of the course code denote the branch/ division. Thus PT stands for Paint Technology Course and CH stands for Chemical Engineering Course. Similarly ES stands for Engineering Sciences and HM for Humanities and Management Sciences.

Third letter denotes the type of the course, viz lecture, practical or lecture + practical. If third letter is L, the said course is of lectures. Practical course is shown by P and C represents the course consisting of lecture + practical. First numeral of the course code denotes the level of course, and the other two are for number of course in particular branch/division.

For example course BSL-101 – mathematics-1. Here BS stands for basic science branch, L for lecture; For 101, first 1 for first year and 01 for first course of basic science.

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Examination System

For each theory paper of 04 and 03 credits, Major Examination with paper of 60 marks and duration of 03 Hours will be conducted.

For each theory paper of 02 credits, Major Examination with paper of 30 marks and duration of 02 Hours will be conducted.

For each practical Lab. of 1.5, 02 and 03 credits, the examination will be conducted for 03 hours duration for CH, ES and BS practical. For all PT/PL/FT/OT labs., the practical examination is of 06 hours duration. For all these practicals, the Major examination carries 60 marks. For practical lab with 01 credit, the exam the examination will be conducted as viva-voce (major- 30, minor - 20)

The overall credits structure

Name of the Course	Code	Credits
B. Tech. Chemical Engineering		
Chemical Engineering	CHE	109.0
Engineering Sciences	ES	32.0
Basic Sciences	BS	35.5
Humanities and Management	HM	10.5
Electives		13.0
Total		200.0
B. Tech. Plastics Technology		
Plastics Technology	PL	65.0
Chemical Engineering	CHE	45.0
Engineering Sciences	ES	32.0
Basic Sciences	BS	35.5
Humanities and Management	HM	10.5
Electives		12.0
Total		200.0
B. Tech. Paints Technology		
Paints Technology	PT	65.0
Chemical Engineering	CHE	45.0
Engineering Sciences	ES	32.0
Basic Sciences	BS	35.5
Humanities and Management	HM	10.5
Electives		12.0
Total		200.0

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B. Tech. Oil Technology		
Oil Technology	OT	65.0
Chemical Engineering	CHE	45.0
Engineering Sciences	ES	32.0
Basic Sciences	BS	35.5
Humanities and Management	HM	10.5
Electives		12.0
Total		200.0
B. Tech. Food Technology		
Food Technology	FT	65.0
Chemical Engineering	CHE	45.0
Engineering Sciences	ES	32.0
Basic Sciences	BS	35.5
Humanities and Management	HM	10.5
Electives		12.0
Total		200.0

Division wise breakup of Courses

Basic Sciences (BS) Core

Code	Course	Credits: Th- Pr	Total Credits
BSL-101	Mathematics-I	4-0	4.0
BSC-102	Organic Chemistry-I	4-1.5	5.5
BSC-103	Physical Chemistry	4-1.5	5.5
BSC-104	Inorganic Chemistry	4-1.5	5.5
BSC-105	Physics	4-1.5	5.5
BSC-202	Organic Chemistry-II	4-1.5	5.5
BSL-201	Mathematics-II	4-0	4.0
TOTAL BS Core		28-7.5	35.5

Engineering Sciences (ES) Core

Code	Course	Credits: Th- Pr	Total Credits
ESC-101	Workshop Technology	2-2	4.0
ESC-102	Computer Science and Application	2-1	3.0
ESC-103	Electrical Engineering and Electronics	4-1	5.0
ESL-104	Generation and Transmission of Mechanical Power	4-0	4.0
ESC-105	Engineering Graphics	2-1.5	3.5
ESL-106	Material Technology	4-0	4.0
ESC-201	Applied & Structural Mechanics	4-1	5.0
ESC-301	Machine Design & Drawing	2-1.5	3.5
TOTAL ES Core		24-8.0	32.0

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Humanities and Management (HM) Core

Code	Course	Credits: Th- Pr	Total Credits
HMC-101	Communication & Soft Skill	3-0.5	3.5
HML-201	Industrial management and Economics	4-0	4.0
HML-301	Managerial Behavior: Psychosocial Dimensions	3-0	3.0
TOTAL HM Core		10-0.5	10.5

Chemical Engineering (CHE) Core for B. Tech. (Chem. Engg.)

Code	Course	Credits: Th- Pr	Total Credits
CHL-201	Introduction to Chemical Engineering	4-0	4
CHC-203	Momentum Transfer	4-1.5	5.5
CHL-204	Process Calculation	4-0	4
CHC-202	Mechanical Operations	4-1.5	5.5
CHL-205	Chemical Engineering Thermodynamics	4-0	4
CHC-206	Heat Transfer	4-1.5	5.5
CHL- 207	Chemical Process Technology	4-0	4
CHC-301	Mass Transfer-I	4-1.5	5.5
CHC-302	Instrumentation & Instrumental Analysis	4-1.5	5.5
CHC-303	Chemical Reaction Engg.-I	4-1	5
CHC-304	Methods in Chemical Mathematical Engg	4-1.5	5.5
CHC-305	Chemical Reaction Engg.-II	4-1.5	5.5
HC-306	Mass Transfer-II	4-1.5	5.5
CHC-307	Process Equipment Design & Drawing	4-1.5	5.5
CHC-401	Modelling, Simulation and CAD	4-1.5	5.5
CHL-402	Transport Phenomena	4-0	5
CHC-403	Process Dynamics & Control	4-1.5	5.5
CHC-404	Plant Design, Economics & Costing	4-1.5	5.5
CHP-407	Industrial Training/Project	0-15	15
CHP-408	Technical Seminar & Colloquium	0-3	3
TOTAL CHE Core		72-37.0	109.0

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Chemical Engineering (CHE) Core for Chemical Technology

Code	Course	Credits: Th- Pr	Total Credits
CHC-202	- Mechanical Operations	4 -1.5	5.5
CHL-205	- Chemical Engineering Thermodynamics	4-0	4
CHC-206	- Heat Transfer	4-1.5	5.5
CHC-203	- Momentum Transfer	4-1.5	5.5
CHL-204	- Process Calculations	4-0	4
CHC308	- Mass Transfer Operations	4-1.5	5.5
CHC-309	- Instrumentation and Process Control	4-1.5	5.5
CHL-310	- Reaction Engineering	4-0	4
CHL-405	- Project Engineering & Economics	4-0	4
CHP-406	- Process Equipment Design	0-1.5	1.5
TOTAL CHE Core		36-9.0	45.0

Plastics Technology (PL) Core

Code	Course	Credits: Th- Pr	Total Credits
PLL-201	- Introduction to Polymer Technology	4-0	4
PLP – 202	- Polymer Identification and Analysis	0-1.5	1.5
PLC-203	- Polymerization Kinetics	4 -0	4
PLP – 204	- Synthesis and Characterization of Polymers	0-3	3
PLC-301	- Chemistry and Technology of Polymers – I	4 -0	4
PLP – 302	- Polymer Synthesis and Analysis	0-1.5	1.5
PLL-303	- Chemistry & Technology of Polymers-II	4-0	4
PLP-304	- Synthesis of Thermosets	0-3	3
PLC-305	- Processing of Plastics – I	4-1.5	5.5
PLL-306	- Mould and Die Design	4-0	4
PLP-307	- Self Study Report	0–1.5	1.5
PLP-401	- Industrial Training/ Project	0-15	15
PLP-402	- Technical Seminar & Colloquium	0-3	3
PLC-403	- Processing of Plastics – II	4 -1.5	5.5
PLC-404	– Polymer Testing	4-1.5	5.5
TOTAL PL Core		32-33.0	65.0

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Paints Technology (PT) Core

Code	Course	Credits: Th- Pr	Total Credits
1. PTC-201	- Anatomy of Paints	4 – 1.5	5.5
2. PTC-202	- Chemistry & Technology of Polymers-I	4 - 3	7
3. PTC-301	- Technology of Pigments	4 – 1.5	5.5
4. PTC-302	- Chemistry & Technology of Polymers-II	4 – 3	7
5. PTL-303	- Trade Sales Paints	4- 0	4
6. PTL-304	- Engineering of Pigmented Dispersion	4-0	4
7. PTP-305	- Formulation & Processing of Paints	0-3	3
8. PTP-401	- Industrial Training	0 -15	15
9. PTP-402	- Technical Seminar & Colloquium	0-3	3
10. PTC-403	- Application Techniques & Paint	4-1.5	5.5
11. PTL-404	- Quality Assurance & Analysis of Surface Coatings	4-0	4
12. PTP-405	- Processing & Testing of Paints	0 – 1.5	1.5
TOTAL PT Core		32-33.0	65.0

Oils Technology (OT) Core

Code	Course	Credits: Th- Pr	Total Credits
1. OTC-201	- Chemistry & Technology of oils and fats	4 – 1.5	5.5
2. OTC-202	- Post Harvest Technology of oil bearing materials	4 – 3	7
3. OTC – 301	- Refining of Oils & Fats	4 – 3	7
4. OTC – 302	- Quality Control Techniques in Oils & Fats	4 – 1.5	5.5
5. OTL -303	- Technology of fat splitting & Soaps	4- 0	4
6. OTL-304	- High fat products & Industrial Hydrogenation	4-0	4
7. OTP-305	- Processing and analysis of soaps and allied products	3-0	3
8. OTP-401	- Industrial Training	0- 15	15
9. OTP-402	- Technical Seminar & Colloquium	0 -3	3
10. OTC-403	- Chemistry of surfactants and oleochemicals	4 – 1.5	5.5
11. OTL – 404	- Technology of Surfactants & Detergents	4- 0	4
12. OTP-405	Synthesis & Analysis of surfactants and detergents	0-1.5	1.5
TOTAL OT Core		32-33.0	65.0

Food Technology (FT) Core

Code	Course	Credits: Th- Pr	Total Credits
FTC-201	Food Chemistry	4-1.5	5.5
FTC-202	Food biochemistry and nutrition	4-3	7
FTC-301	Principles of food preservation	4-1.5	5.5
FTC-302	Microbiology and molecular biology	4-3	7
FTC-303	Food processing-I	4-1.5	5.5
FTC-304	Food Biotechnology	4-1.5	5.5
FTP-401	Industrial Training/ Project	0-15	15
FTP-402	Technical Seminar & Colloquium	0-3	3
FTC-403	Food processing- II	4-1.5	5.5
FTC-404	Food Quality	4-1.5	5.5
TOTAL FT Core		32-33.0	65.0

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CHL-313	Plant Utility and safety
CHL-314	Petroleum Refining Engineering
CHL-315	Bio- fuels
CHL-316	Industrial Pollution control
CHL-317	Newer separation Techniques
CHL-407	Advanced Pharmaceutics
CHL-408	Fundamentals of Computational Fluid Dynamics
PTL-306	Thinners, Solvents and Reactive Diluents
PTL-307	Specialty Pigments and Additives in Coatings
PTL-308	Newer Techniques of Synthesis of Polymers
PTL-309	Ecofriendly Coating Technologies
PTL/PLL-310	Physicochemical Characterisation of Polymers
PTL-311	Technology of Printing Inks
PTL-312	Coating Flow and Piping and Pump Calculations in Paint Plant
PTL-407	Special Purpose and Effect Coatings
PTL-408	Theory & Prevention of Corrosion
PTL-409	Nanotechnology in Paint Industry
PTL-410	Design of Experiments and Coating Process Automations
PLL-308	Rubber Technology
PLL-309	High Performance Polymers
PLL-311	Plastics Waste Management
PLL-312	Polymer Reaction Engineering
PLL-313	Polymer Rheology
PLL-405	Polymer Blends and Composites
PLL-406	Plastics for Packaging
PLL-407	Theory of Adhesion and Adhesives
PLL-408	Polymer Nanocomposites: Synthesis and Characterization
FTL-305	Advanced technology in food packaging
FTL-306	Cereals and pulses processing technology
FTL-307	Treatment and disposal of food industrial waste
FTL-308	Fruits and vegetable processing technology
FTL-405	Biochemical engineering
FTL-406	Dairy technology
OTL-306	Technology of Waxes & Biochemistry of Lipids
OTL-307	Modified and Tailor made oils
OTL-308	Bio Technology of oils and fats
OTC-309	Technological advances in Perfumery & Cosmetics*
OTL-406	Packaging of oils, fats and allied products.
OTL-407	Advanced Oil Chemistry and Oleochemicals

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OTL-408 Environmental aspects of oil and allied industries.

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* Electives with * have 3 hrs. theory, 2 hrs. practical with total of 4 credits.

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