Course Structure and Regulation for the Four-Semester Master of Technology (M. Tech.) Program in Chemical Engineering, University of Calcutta

2015

Department of Chemical Engineering
University of Calcutta

1. A Candidate who has passed the B. Tech. Examination in Chemical Engineering of University of Calcutta or has passed equivalent degree from other Universities, IIT's and NIT's duly approved by the AICTE will be eligible for admission to the Master of Technology (M. Tech.) course in Chemical Engineering.
2. The nomenclature and duration of the course and total credit of the examination for M. Tech. degree in Chemical Engineering shall be as follows.

Name of Examination	Duration of Course	Total Credits
M. Tech. 1st Semester	6 months	24
M. Tech. 2nd Semester	6 months	24
M. TECH. 3RD Semester	6 months	20
M. Tech. 4th Semester	6 months	20

3. A candidate for the M. Tech. degree in Chemical Engineering shall have to appear in M. Tech. Semesters I, II, III and IV (final) examinations and the total credits shall be 88; the semester wise distribution is given below:

   i) 24 credits for M. Tech. 1st Semester consisting of 3 Core subjects (Core I, Core II & Core III) (see appendix-I) of 4 credits each and 2 elective papers [Elective I & Elective II (for specialization)] of 4 credits each, Laboratory course and Seminar of 2 Credits each.

   ii) 24 credits for M. Tech. 2nd Semester consisting of 2-Core subjects (Core IV and Core V, see appendix-II) each of 4 credits and 2 elective subjects, Elective- III and Elective- IV (for respective specialization), each of 4 credits and 2 Laboratory courses each of 4 credits [Laboratory of respective specialization (Paper –V) and Project Seminar (Paper – VI)]

   iii) 20 Credits for M. Tech. 3rd Semester (Project Work-Thesis I)

   IV) 20 Credits for M. Tech. 4th Semester (Project Work- Thesis II)
4. A theoretical paper of 4 Credits means 4 lecture hours or 3 lecture hours and 1 tutorial- hour per week; practical paper of 2 credits ordinarily means 3 contact hours in the laboratory per week, and practical paper of 4 credits ordinarily means 6 contact hours in the Laboratory per week.
5. A candidate shall be eligible to sit for any of the Semester Examination provided he/she completes the regular course of studies in the Department of Chemical Engineering and attends at least 65% of the total number of theoretical classes, 75% of practical classes and seminars separately held during the semester.
6. End-of –Semester Examination.
   a. End-of-Semester Examination of each 4 credit theoretical paper shall carry 100 marks and shall be of 3 hours duration. The paper- setting and evaluation of theoretical papers shall be done by Internal Examiners only (at least 2).Theoretical papers shall be moderated by a Board of Moderators, consisting of at least 4 internal teachers including the Head of the Department as Chairman of the Board.
   b. End-of-Semester Examination of each 2 credit practical paper shall carry 50 marks and shall be of 4 hours duration, and 4 credit practical paper shall carry 100marks and shall be of 6 hours duration. Examination of practical paper(s) shall be jointly conducted by Internal and External Examiners.

Examination of Paper MChE – 107 (Seminar) and Paper MChE- 206 (Project Seminar) shall be conducted only by Internal Examiners.

The paper Project Work (Thesis)-I (MChE 301) and Project Work (Thesis)-II (MChE 401) shall be 20 credits paper each and shall carry 500 marks each.

c. The end of Semester Examination for each Semester shall ordinarily be commenced on completion of the courses for the Semester (clause-2). Ordinarily the odd-semester Examination will commence in the month of December and the even-Semester Examination will commence in the month of June of the year. Students will be allowed provisionally to join the classes of the next Semester, which shall ordinarily commence just after completion of the end-Semester Examination. However, if a candidate fails to secure the required GPA (Grade Point Average) for the end-Semester Examination (clause 2), he/she shall have to revert back and continue his/her course of studies in the same Semester in which he/she failed along with the students of the next batch.

7. Examiners shall forward results of assessment of each candidate to the Controller of Examinations in terms of marks and grades. A 10- point grade system will be followed. The description of the grades is as follows:

Grade		Numerical Valves	Percent Mark
Ex	Excellent	10	90-100
A	Very Good	9	80-89
B	Good	8	70-79
C	Satisfactory	7	60-69
D	Fair	6	50-59
P	Poor	5	35-49 Theoretical paper 40-49 Practical Paper
F	Fail or absent at the end Semester Examination	O	Below 35 Theoretical paper Below 40 Practical Paper

8. The grade point awarded to a student in a theory paper shall be on the basis of his/her performance at the end Semester Examination, home assignments, viva-voce and at least one written test during the semester. For this purpose 70% weightage shall be given to the end Semester Examination and 30% weightage shall be given to the home assignments, viva-voce and written test/s.

9. The grade point awarded to a candidate in a practical paper shall be on the basis of his/her performance at the end Semester Examination and day-to-day experimental work, laboratory records

and viva-voce examination during the Semester. For this 70% weightage shall be given to the end Semester Examination and 30% weightage shall be given to the day-to-day experimental work, laboratory record and viva-voce examination during the Semester provided that

a. In case of paper Seminar (MChE 107) a candidate shall deliver lecture on a pre-assigned topic during the Semester and submit a term paper (3 copies) which will be assessed by a Board consisting of at least 3 Internal Examiners including the teacher(s) in- charge and Head of the Department (Chairman of the Board). Assessment of the student shall be on the basis of the term paper submitted and performance at the seminar.
b. In case of paper Project Seminar (MChE- 206) a candidate shall deliver lecture on their Project work followed by a viva-voce examination at the end of the Semester. Such Seminar and the Viva-voce examination will be organized centrally in the department and assessment will be done by supervisor(s)and 2 other internal teachers only.
c. In case of paper Project Work (Thesis) – I (MChE 301) and Project Work (Thesis) –II (MChE – 401) a research problem shall be assigned to a candidate during Semester – II. He/ She shall work on the assigned problem under the supervision of a teacher in the Department or in a plant for the next two Semester (Semester III and Semester IV). In case of Project in a plant the student will work under two joint supervisors (one from the Plant and one from the Department).

   For (MChE 301) three type-written and bound copies of an interim progress report on the research problem shall be submitted by the candidate at least 15 days before the commencement of M. Tech. 3rd Semester Examination. The examination of Project Work (Thesis) – I (MChE 301) shall be conducted by a Board of internal examiners consisting of at least three Internal examiners including the supervisor (s) on the basis of report submitted and presentation of the report in a Seminar arranged by the department during the end Semester Examination.

   For the paper MChE 401 three type-written and bound copies of the final report on the research problem shall be submitted by the candidate at least 15 days before the commencement of M. Tech. 4th Semester examination. The examination for Project Work (Thesis) – II (MChE 401) shall be conducted by a Board of Examiners consisting of the supervisor(s) and two external examiners on the basis of the report submitted and presentation by the candidate in a Seminar arranged by the department during the final examination.

10. **Grade Point Average (GPA) for a semester**. The Grade Point Average (GPA) of a candidate in a Semester examination shall be computed on the basis of grades secured by him/ her in different papers of the semester. An example for computation of GPA of a student in a Semester is given in the Appendix- III.
11. i. The candidates securing GPA of 5.0 or higher in a semester examination (Semester I to III) shall qualify to continue his/her studies in the corresponding next semester.

The Syndicate shall publish a list of successful candidates for each semester examination (semester I, II,III) indicating the GPA secured by each candidate. Candidates who fail to secure grade point of at least 5.0 in upto a maximum of two theoretical papers in semester I or in semester II may also be allowed to continue his/her studies in the subsequent semester class, but he/she will have to appear in these papers in the supplementary examination to be held (at the time of the examination of the next

semester examination / within one month from the date of publication of result of the corresponding semester examination). If the candidate secures grade point of 5.0 or higher separately in these papers in the supplementary examination, he/ she will be declared to have passed the semester examination. A candidate who fails to secure grade point of at least 5.0 separately in each paper in the supplementary examination, he/she will be considered to have failed and will have to revert back to the corresponding semester and repeat all the subsequent semester in usual sequence.

ii. If a candidate who fails to secure at last 5.0 separately in more than 2 theoretical papers then he/she will be considered as failed in the semester examination and will have to revert back to the corresponding semester classes with the students of the next batch.

iii. Candidate who fails to secure at least 5.0 in a practical paper (laboratory and Project) in a semester examination, (for instance Semester I, Semester II, Semester III or Semester IV) will be considered as failed in the semester examination and will have to revert back to the corresponding semester classes with the students of the next batch.

12. i. Candidates securing a CGPA of 5.0 or higher at the end of the 4th Semester (final) examination shall be declared to have passed the Master of Technology Examination in Chemical Engineering.
ii. Candidate, who is unable to complete his/ her project work Thesis- II within stipulated time may apply to the Head of the Department through the supervisor and he/she may be allowed to complete his/ her project work in one more semester.

APPENDIX- I

Schedule of Papers and distribution of credits for M. Tech. Semester I, II, III & IV (final) examination in Chemical Engineering

Semester – I

Theoretical Papers

		L	T	P	Credit	Full Marks
Paper –I (MChE-101)	Core – I Mathematical Methods in Chemical Engineering	3	1	0	4	100
Paper – II (MChE-102)	Core – II Transport Phenomena	3	1	0	4	100
Paper – III (MChE-103)	Core – III Process Modeling and Simulation	3	1	0	4	100

Paper – IV	Elective– I Specialization wise	3	1	0	4	100
Paper – V	Elective – II Specialization wise	3	1	0	4	100

Practical Papers

Paper – VI (MChE-106)	Numerical Methods Lab	0	0	3	2	50
Paper – VII (MChE-107)	Seminar	0	0	3	2	50
			Total		24	600

Semester – II

Theory Papers

		L	T	P	Credit	Full Marks – I
Paper –I (MChE-201)	Core – IV	3	1	0	4	100
Paper – II (MChE-202)	Core – V	3	1	0	4	100
Paper – III	Elective– III Specialization wise	3	1	0	4	100
Paper – IV	Elective– IV Specialization wise	3	1	0	4	100

Practical Papers

Paper – V	Laboratory (Specialization wise)	0	0	6	4	100
Paper – VI (MChE-206)	Project Seminar	0	0	6	4	100
			Total		**24**	**600**

Semester – III

Practical Papers

Paper – I (MChE-301)	Project Work (Thesis) – I	20	500

Semester IV (final)

Practical Papers		20	500
Paper – I (MChE-401)	Project Work (Thesis) - II		

APPENDIX- II

Department will offer courses in such a way so that students will take two courses (CORE IV and CORE – V) in semester – II from the following five papers

Papers

1. Reaction Engineering
2. Statistical Thermodynamics
3. Process Dynamics & Control
4. Process Design / Synthesis, Product Design
5. Optimization methods in Chemical Engineering

Department will offer following four specializations of which each student shall have to take one of the specializations. Elective papers for different specialization are as follows:

1. Specialization: Process Engineering (PE)
   Elective- I, (MChE-141) Process Engineering – I
   Elective- II, (MChE-151) Process Engineering – II
   Elective – III, (MChE-231) Process Synthesis
   Elective – IV, (MChE-241) Industrial Engineering
   Elective – V (MChE- 251),Process Simulation (Practical)

2. Specialization: Petrochemicals and Petroleum Refinery Engineering (PPRE)
   Elective- I, (MChE-142) Petroleum Science
   Elective- II, (MChE-152) Petroleum Production, Environment & Economic Aspects.
   Elective- III, (MChE-232) Refinery Engineering
   Elective- IV, (MChE-242) Petrochemicals
   Elective - V (MChE -252), Petroleum Laboratory (Practical)

3. Specialization: Environmental Engineering (EE)
   Elective- I, (MChE-143) Industrial Hazards and Plant Safety
   Elective- II, (MChE-153) Water Pollution & Waste Water Treatment
   Elective- III, (MChE-233) Air Pollution & Control
   Elective- IV, (MChE-243) Solid Waste Management and Environmental Management Systems
   Elective – V (MChE- 253)(Practical), Environmental Engineering Laboratory.

4. Specialization: Biotechnology (BT)
   Elective – I, (MChE-144)Biotechnology Fundamental
   Elective – II, (MChE-154) Molecular Biology & Genetic Engineering
   Elective – III, (MChE-234)Biochemical Engineering
   Elective- IV, (MChE-244)Bioprocess Modeling & Simulation
   Elective – V (MChE- 254) (Practical), Biotechnology Laboratory

APPENDIX- III

Example Paper	**Theory**	**Credit**	**Grade Assigned**	**Numerical Value**	**Grade Point**
MChE – 101	Mathematical Methods in Chemical Engineering	4	A	9	4X9=36
MChE – 102	Transport Phenomena	4	B	8	4X8=32
MChE – 103	Process Modeling & Simulation	4	D	6	4x6=24
MChE – 104	Elective – I (Paper name according to specialization)	4	EX	10	4X10= 40
MChE – 105	Elective- II (Paper name)	4	A	9	4X9= 36
	Total	**20**			**168**
Paper	**Practical**				

MChE – 106	Numerical Methods Lab	2	C	7	2X7=14
MChE – 107	Seminar	2	A	9	2X9=18
	Total	**4**	--	--	**32**
	Grand Total	**24**	--	--	**200**

SGPA = Total Grade point earned in the semester = 200 = 8.33
Total Grade of the Semester 24

CGPA = Total Grade point earned in the semesters(I-IV)
Total Grades of the Semesters (I-IV)

Remarks- Q- Qualified for next semester, XP – Qualified for supplementary examination in paper (s)
X – Failed in the semester examination.
Conversion of CGPA or SGPA to percentage of marks.
Percentage of marks = (CGPA-0.5) X 10%

13. Candidates securing a CGPA 6.5 or higher shall be placed in First Class (I) and candidates securing CGPA of 5.0 or higher but less than 6.5 shall be placed in Second Class (II).
The Syndicate will publish a list of successful candidates in these two categories in order of merit on the basis of the CGPA (calculated upto 2nd place of decimal) secured by a candidate.
14. A candidate discontinuing the programme with acceptable performance can resume and complete the programme within five academic year from the date of his/her admission to the 1st Semester M. Tech. course.
15. This Regulation for M. Tech. Semester examinations in Chemical Engineering shall be effective from the academic session 2010-2011 and all subsequent academic session.
16. The degree of the Master of Technology (M. Tech.) in Chemical Engineering shall be awarded to a successful candidate mentioning the Class he/she has obtained, in the following form.

University of Calcutta
(Emblem)

This is to certify that……obtained the degree of Master of Technology in Chemical Engineering of this University in the year…….. and that he/she was placed in the……Class.

Senate House Vice- Chancellor