Course Structure of M.Tech. / M.Tech. + Ph.D. Dual Degree Program in Chemical Processes Design and Intelligence
(From AY 2026-27)

Minimum Educational Qualification:

a) Four-year Bachelor's degree or five-year integrated degree in Chemical Engineering, Material Science and Engineering, Mechanical Engineering, Chemical Technology (Polymer, Petroleum, Petrochemical etc.), Engineering Sciences, Energy Science and Engineering, environmental engineering, ceramic Engineering, Metallurgical Engineering, Mineral Processing and Engineering, Biotechnology, Biomedical Engineering, Rubber/ Oil/ Paint/Paper and Pulp/ Textile/ Food Technology, (with first division as defined by the awarding Institute/ University)

b) Two-year M.Sc. or five-year integrated degree in Biotechnology/ Physics/ Chemistry

Marks /CGPA/ CPI/ Percentage requirements in Qualifying Degrees: -

I. For UR/EWS/OBC(NCL) category:
   a. A minimum of 60% marks in aggregate, OR
   b. A First class as specified by the university, OR
   c. A minimum Cumulative Grade Point Average (CGPA) / Cumulative Performance Index (CPI) of 6.0 on a scale of 0 – 10, OR
   d. An equivalent to 6.0 CGPA/ CPI on other corresponding proportional requirements when the scales are other than 0 – 10.

II. For SC/ST/PwD category

   a) A minimum of 55% marks in aggregate, OR
   b) A First class as specified by the university, OR
   c) A minimum Cumulative Grade Point Average (CGPA) / Cumulative Performance Index (CPI) of 5.5 on a scale of 0 – 10, OR
   d) An equivalent to 5.5 CGPA/ CPI on other corresponding proportional requirements when the scales are other than 0 – 10.

Qualifying Examination:

(a) Indian students: Valid GATE qualification in Chemical Engineering, Mechanical Engineering, Engineering Sciences, Environmental Science & Engineering, Metallurgical Engineering, Biotechnology, Biomedical Engineering, Chemistry, Physics, Petroleum Engineering, Textile Engineering & Fibre Science.
(b) International students: Valid score of TOEFL or IELTS and valid score of GRE.

Categories of Admission:

(a) Indian Students: Teaching Assistantship (TA); (ii) Highly motivated sponsored candidate (SW) on full-time basis from highly reputed R and D organizations such as DRDO, ISRO, BHEL, BARC, HPCL, ONGC, etc. and highly reputed Industries; (iii) Defense Forces (DF): Candidates sponsored by the Defense Forces; (iv) Regular institute staff (IS) of IIT Indore on part-time basis only. Candidates of SW, DF and IS categories will not be provided any scholarship.
(b) International Students: (i) International self-financed (ISF) students; (ii) International students sponsored by non-government organizations or by a reputed industry (ISW); (iii) International students sponsored by foreign government or its organizations or through mutual collaborative programs of India with other countries (GSW)

Duration of Program: 2 years on full-time basis

Course Structure

1st Year: Semester-I

Course Code	Course Title	Contact Hours (L-T-P)	Credit
ChE 6XX	Transport Phenomena in Chemical Processes	2-1-0	3
ChE 6XX	Advanced Reaction Engineering	2-1-0	3
ChE 6XX	Thermodynamics for Chemical Process Design	2-1-0	3
ChE 6XX	Process Monitoring & Control Systems	2-1-0	3
ChE 6XX	Department Elective I	2-1-0	3
ChE 6XX	Applied Computational Methods Lab	0-0-3	1.5
ChE 6XX	Analytical tools and Techniques Lab	0-0-3	1.5
Total minimum credits earned during the semester			**18**

1st Year: Semester-II

Course Code	Course Title	Contact Hours (L-T-P)	Credit
ChE 6XX	Chemical Systems Design	2-1-0	3
ChE 6XX	Department Elective II	2-1-0	3
ChE 6XX	Department Elective III	2-1-0	3
ZZ 6XX	Institute Elective	2-1-0	3
ChE 6XX	Scientific Communication & Research Methodology	0-2-0	2
ChE 6XX	Flexi-Core I	2-1-0 [3/2]	1.5
ChE 6XX	Flexi-core II	2-1-0 [3/2]	1.5
ChE 6XX	Chemical Process Safety and Risk Assessment	1-0-0	1
	Total minimum credits earned during the semester		**18**

2nd Year: Semester–III

Course Code	Course Title	Contact Hours	Credit
ChE 7XX	M. Tech. Research Project (Stage-I)	0-0-24	12
ChE 7XX	Design & Innovation Project	0-1-10	6

2nd Year: Semester–IV

Course Code	Course Title	Contact Hours	Credit
ChE 7XX	M. Tech. Research Project (Stage-II)	0-0-36	18
Total minimum credits to be earned during the program			**72**

List of Flexi-core Electives:

Course Code	Course Title	Contact Hours	Credit
ChE 6XX	Mathematics and Statistics for Chemical Engineering	2-1-0 [3/2]	1.5
ChE 6XX	Design of Experiments	2-1-0 [3/2]	1.5
ChE 6XX	Data Analytics and ML for Process Modelling	2-1-0 [3/2]	1.5

List of Flexi-core courses:

Course Code	Course Title	Contact Hours	Credit
ChE 6XX	Data Analytics and ML for Process Modelling	2-1-0 (Half-semester)	1.5
ChE 6XX	Mathematical Methods in Chemical Engineering	2-1-0 (Half-semester)	1.5
ChE 6XX	Design of Experiments	2-1-0 (Half-semester)	1.5

List of Department Electives:

Bucket 1 Courses for Electives: Biological Systems Engineering

Course Code	Course Title	Contact Hours	Credit
ChE 408/608	Computational Synthetic Systems Biology	2-1-0	3
ChE 404/604	Advanced Soft Matter	2-1-0	3
ChE 6XX	Bioseparations and Downstream Processing	2-1-0	3

Bucket 2 Courses for Electives: Catalysis, Energy & Sustainability

Course Code	Course Title	Contact Hours	Credit
ChE 406/606	Heterogeneous Catalysis and Reactor Design	2-1-0	3
ChE 6XX	Sustainable Engineering Principles	2-1-0	3
ChE 6XX	CO2 capture, utilization and storage	2-1-0	3
ChE 402/602	Process Optimization	2-1-0	3

Bucket 3 Courses for Electives: Complex Fluid & Rheology

Course Code	Course Title	Contact Hours	Credit
ChE 6XX	Rheology of Complex Fluids	2-1-0	3
ChE 404/604	Advanced Soft Matter	2-1-0	3
ChE 6XX/4XX	Computational Fluid Dynamics for Chemical Engineering	2-1-0	3

Suggested Institute Electives:

BSE 611	Biochemistry	2-1-0	3
BSE 617	Biomolecular Modeling	2-1-0	3
CH 710	Molecular Modeling and Computational Chemistry	2-1-0	3
MM 605	Green Hydrogen: Materials and Technologies	2-1-0	3
BSE 641	Engineered Systems Analysis	2-1-0	3
CH 708	Catalysis: Approaches and Applications	2-1-0	3
CE 621	Water Quality and Treatment	2-0-2	3
BSE 619	Renewable Energy Technologies	2-1-0	3
CH 616	Chemical Kinetics and Electrochemistry	2-1-0	3
EV 607/ EV 407	Energy Storage in Electric Vehicle	2-1-0	3
CH 710	Molecular Modeling and Computational Chemistry	2-1-0	3
MM 676	Advanced Computational Methods for Materials	2-1-0	3