

# Table of Curriculum (Undergraduate)

Classification	Course No.	Computer Code	Course Title	Lecture:Lab.: Credit (Homework)	Semester	Note
Mandatory Major Courses	CBE201	39.201	Molecular Engineering Laboratory	1:6:3(6)	Fall	
	CBE202	39.202	Introduction to Chemical and Biomolecular Engineering	3:0:3(3)	Spring	
	CBE203	39.203	Industrial Organic Chemistry	3:0:3(3)	Spring or Fall	
	CBE205	39.205	Chemical and Biomolecular Engineering Analysis	3:0:3(3)	Spring	<input type="checkbox"/> MAS101, MAS102
	CBE221	39.221	Molecular Thermodynamics and Energy Systems	3:0:3(3)	Fall	
	CBE301	39.301	Chemical and Biomolecular Engineering Laboratory	1:6:3(6)	Spring	
Elective Major Courses	CBE207	39.207	My CBE-Career Planning in Chemical and Biomolecular Engineering	1:0:1	Spring	
	CBE260	39.260	Biomolecular Engineering	3:0:3(3)	Spring	
	CBE303	39.303	Physical Chemistry for Chemical and Biomolecular Engineers I	3:0:3	Fall	
	CBE321	39.321	Separation Processes	3:0:3(3)	Fall	<input type="checkbox"/> CBE202, CBE221
	CBE341	39.341	Process Simulation and Control	3:1:3(3)	Spring	
	CBE362	39.362	Bioinformatics	3:0:3(3)	Fall	
	CBE363	39.363	Introduction to Metabolic Engineering and Synthetic Biology	3:0:3	Spring or Fall	
	CBE371	39.371	Electrochemical Principles for Chemical and Biomolecular Engineering	3:0:3	Spring	
	CBE404	39.404	Physical Chemistry for Chemical and Biomolecular Engineers II	3:0:3(3)	Spring or Fall	⊙
	CBE441	39.441	Techniques of Process and Product Design	3:0:3(3)	Spring	⊙ <input type="checkbox"/> CBE202, CBE221, CBE321
	CBE442	39.442	Chemical and Biomolecular Engineering Capstone Design Project	3:0:3(3)	Fall	⊙ <input type="checkbox"/> CBE311, CBE321, CBE441
	CBE444	39.444	Introduction to Molecular Modeling and Simulations	3:0:3	Spring or Fall	⊙ <input type="checkbox"/> CBE206
	CBE452	39.452	Polymer Synthesis for Chemical and Biomolecular Engineers	3:0:3	Spring or Fall	⊙
	CBE455	39.455	Nanochemical Technology	3:0:3(3)	Spring or Fall	⊙
	CBE461	39.461	Biorefineries for Fuels and Chemicals	3:0:3(3)	Spring or Fall	⊙
	CBE462	39.462	Bioseparation Engineering	3:0:3	Spring or Fall	⊙
	CBE463	39.463	Engineering Principles in Biological Systems	3:0:3	Spring or Fall	⊙
	CBE464	39.464	Big Data Analysis and Machine Learning for Biotechnology	3:0:3	Spring or Fall	⊙ <input type="checkbox"/> CBE260, CBE261
	CBE472	39.472	Introduction to New and Renewable Energy	3:0:3	Spring	⊙
	CBE473	39.473	Microelectronics Processes	3:0:3(3)	Spring or Fall	⊙
CBE474	39.474	Instrumental Analysis for Chemical Engineers	3:0:3	Spring or Fall	⊙	
CBE481	39.481	Special Topics in Chemical and Biomolecular Engineering	3:0:3(3)	Spring or Fall	⊙ Subtitle is assigned	
CBE491	39.491	Special Topics in Chemical and Biomolecular Engineering II	2:0:2(2)	Spring or Fall	⊙ Subtitle is assigned	
CBE492	39.492	Special Topics in Chemical and Biomolecular Engineering III	1:0:1(1)	Spring or Fall	⊙ Subtitle is assigned	
Advanced Major	CBE206	39.206	Introduction to Numerical Methods for Chemical and Biomolecular Engineers	3:0:3	Fall	<input type="checkbox"/> MAS101, MAS102
	CBE261	39.261	Biochemical Engineering	3:0:3(3)	Fall	
	CBE311	39.311	Molecular Reaction Engineering	3:0:3(3)	Spring	
	CBE331	39.331	Fluid Mechanics for Chemical Engineering	3:0:3(3)	Spring	<input type="checkbox"/> CBE205
	CBE332	39.332	Heat and Molecular Transfer	3:0:3(3)	Spring	
	CBE351	39.351	Introduction to Macromolecular Engineering	3:0:3(3)	Spring or Fall	
Research	CBE490	39.490	Undergraduate Research	0:6:3	Spring or Fall	
	CBE495	39.495	Individual Study	0:6:1	Spring or Fall	
	CBE496	39.496	Seminar for Undergraduate Students	1:0:1	Spring or Fall	

# Table of Curriculum (Undergraduate)

Classification	Course No.	Computer Code	Course Title	Lecture:Lab.: Credit (Homework)	Semester	Note
Mandatory Major Courses	CBE601	39.601	Research Methodology for Chemical and Biomolecular Engineers	2:3:3(3)	Spring	
	CBE602	39.602	Problem Solving in Chemical and Biomolecular Engineering	3:0:3	Spring or Fall	
Elective Courses	CBE502	39.502	Engineering Applied Mathematics	3:0:3(4)	Fall	⊙
	CBE503	39.503	Numerical Methods for Chemical Engineers	3:0:3(4)	Spring	⊙
	CBE505	39.505	Chemical Process and Product Design	3:0:3	Fall	⊙
	CBE511	39.511	Design of Reaction Systems	3:0:3(3)	Spring or Fall	⊙
	CBE512	39.512	Introduction to Catalysis Engineering	3:0:3(4)	Spring or Fall	⊙
	CBE513	39.513	Catalysis for Renewables	3:0:3	Spring	⊙
	CBE522	39.522	Introduction to Interfacial Engineering	3:0:3(3)	Spring	⊙
	CBE523	39.523	Rate-controlled Separation Processes	3:0:3(4)	Spring	⊙
	CBE525	39.525	Molecular Electronics	3:0:3(3)	Spring or Fall	⊙
	CBE531	39.531	Multiphase Reactor Engineering	3:0:3(3)	Spring	⊙
	CBE532	39.532	Mass Transfer	3:0:3(4)	Spring	⊙
	CBE533	39.533	Fundamentals of Microstructured Fluid Flow	3:0:3(4)	Spring or Fall	⊙
	CBE541	39.541	Advanced Process Control I	3:0:3(4)	Spring	⊙
	CBE542	39.542	Process Optimization	3:0:3(4)	Spring	⊙
	CBE543	39.543	Process Systems Engineering Theories and Methods	3:0:3	Fall	⊙ □CBE341
	CBE544	39.544	Machine Learning Analysis for Molecules and Materials	3:0:3	Spring or Fall	⊙
	CBE551	39.551	Polymer Rheology	3:0:3(3)	Spring or Fall	⊙
	CBE552	39.552	Materials Engineering of Polymers	3:0:3(3)	Spring or Fall	⊙
	CBE554	39.554	Physical Principles of Polymers	3:0:3(3)	Fall	⊙
	CBE556	39.556	Structure and Properties of Macromolecules	3:0:3(3)	Spring	⊙
	CBE562	39.562	Drug Design, Development and Delivery	3:0:3	Fall	⊙
	CBE563	39.563	Protein Engineering	3:0:3(3)	Spring or Fall	⊙
	CBE564	39.564	Bioprocess Engineering	3:0:3(3)	Fall	⊙ □CBE261, CBE311
	CBE567	39.567	Metabolic Engineering	3:0:3(4)	Fall	⊙
	CBE568	39.568	Nanobiotechnology for Biochemical Engineers	3:0:3(3)	Spring or Fall	⊙
	CBE569	39.569	Nucleic Acid Engineering	3:0:3(3)	Spring or Fall	⊙
	CBE571	39.571	Energy Engineering	3:0:3(4)	Fall	⊙
	CBE572	39.572	Inorganic Materials Processing	3:0:3(4)	Spring or Fall	⊙
	CBE573	39.573	Fuel Cell Processes and Materials	3:0:3(3)	Fall	⊙
	CBE581	39.581	Micro-chemical and Biomolecular Systems	3:0:3(3)	Spring	⊙ □CBE260
	CBE591	39.591	Special Lectures in Chemical and Biomolecular Engineering	3:0:3	Spring or Fall	⊙ Subtitle is assigned
	CBE611	39.611	Theory of Catalysis	3:0:3(3)	Spring or Fall	
CBE612	39.612	Design of Catalysis	3:0:3(4)	Spring or Fall	□CBE203	
CBE613	39.613	Photocatalytic Reaction Engineering	3:0:3	Fall		
CBE621	39.621	Phase Equilibria and Physical Properties	3:0:3(4)	Spring or Fall		
CBE622	39.622	Mixing Technology in Chemical Engineering	3:0:3(3)	Spring or Fall		

Classification	Course No.	Computer Code	Course Title	Lecture:Lab.: Credit (Homework)	Semester	Note
Elective Courses	CBE623	39.623	Thin Film Nanotechnology	3:0:3	Fall	
	CBE624	39.624	Nanomaterials and Nanotechnology for Energy and Environment	3:0:3	Spring	
	CBE631	39.631	Microfluidics	3:0:3(4)	Fall	
	CBE632	39.632	Colloids and Surface Chemistry	3:0:3(3)	Fall	
	CBE641	39.641	Advanced Process Design	3:0:3(4)	Spring or Fall	
	CBE651	39.651	Multicomponent Polymer Materials	3:0:3(1)	Fall	
	CBE652	39.652	Polymer Characterization	3:0:3(3)	Fall	☐CBE351
	CBE653	39.653	Mechanical Properties of Polymers	3:0:3(4)	Spring or Fall	
	CBE664	39.664	Process for Recombinant Microorganisms	3:0:3(3)	Spring or Fall	
	CBE672	39.672	Air Pollution Control	3:0:3(3)	Fall	
	CBE673	39.673	Water Pollution Control	3:0:3(3)	Spring	
	CBE680	39.680	Membrane Technology	3:0:3(3)	Fall	
	CBE682	39.682	Organic Nano-Structured Materials	3:0:3(3)	Fall	
	CBE683	39.683	Electroactive Polymeric Materials and Devices	3:0:3	Spring or Fall	☐CBE351
	CBE711	39.711	Advanced Reaction Engineering	3:0:3(4)	Spring or Fall	
	CBE712	39.712	Surface Phenomena	3:0:3(3)	Spring or Fall	
	CBE731	39.731	Polymer Fluid Dynamics	3:0:3(3)	Spring or Fall	
	CBE741	39.741	Advanced Process Control II	3:0:3(4)	Spring	
	CBE751	39.751	Advanced Rheology of Polymer	3:0:3(3)	Spring or Fall	
	CBE761	39.761	Bioprocess Analysis and Control	3:0:3(3)	Spring	☐CBE564
	CBE771	39.771	Advanced Electrochemical Engineering	3:0:3(4)	Spring or Fall	☐CBE371
	CBE773	39.773	Recent Topics in Chemical & Biomolecular Engineering	3:0:3(3)	Spring or Fall	Subtitle is assigned
	CBE811	39.811	Special Topics in Chemical Reaction Engineering	3:0:3(3)	Spring or Fall	Subtitle is assigned
	CBE821	39.821	Special Topics in Chemical Engineering Thermodynamics	3:0:3(4)	Spring or Fall	Subtitle is assigned
	CBE831	39.831	Special Topics in Transport Phenomena	3:0:3(3)	Spring or Fall	Subtitle is assigned
	CBE832	39.832	Special Topics in Separation Processes	3:0:3(4)	Spring or Fall	Subtitle is assigned
	CBE841	39.841	Special Topics in Process Engineering	3:0:3(3)	Spring or Fall	Subtitle is assigned
	CBE851	39.851	Special Topics in Polymer Engineering	3:0:3(3)	Spring or Fall	Subtitle is assigned
CBE861	39.861	Special Topics in Biochemical Engineering	3:0:3(3)	Spring or Fall	Subtitle is assigned	
CBE871	39.871	Recent Topics in Chemical & Biomolecular Engineering II	2:0:2(2)	Spring or Fall	Subtitle is assigned	
CBE872	39.872	Recent Topics in Chemical & Biomolecular Engineering III	1:0:1(1)	Spring or Fall	Subtitle is assigned	
Research	CBE960	39.960	Thesis <Master Student>		Spring or Fall	
	CBE966	39.966	Seminar <Master Student>	1:0:1	Spring or Fall	
	CBE980	39.980	Thesis <Ph.D. Student>		Spring or Fall	
	CBE986	39.986	Seminar <Ph.D. Student>	1:0:1	Spring or Fall	
	CBE998	39.998	Practicum in Chemical and Biomolecular Engineering I	0:3:1	Summer or Winter	
	CBE999	39.999	Practicum in Chemical and Biomolecular Engineering II	0:6:2	Summer or Winter	

☉: Course mutually recognized by undergraduate and graduate programs ☐: Prerequisite Courses

※ Course classification, course title, and mutual recognition of credits may differ according to the effective year of the requirements.

## Substitute Course List

Substitute Courses Offered by Other Departments					
Category	Courses Offered by the Department		Courses Offered by Other Departments		
	Course No.	Course Title	Course No.	Course Title	Remark
Undergraduate	CBE203	Industrial Organic Chemistry	CH221	Organic Chemistry I	Unidirectional substitution
Undergraduate	CBE260	Biomolecular Engineering	BS209	Molecular Biology	Unidirectional substitution
Undergraduate	CBE303	Physical Chemistry for Chemical and Biomolecular Engineers I	CH213	Physical Chemistry II	Unidirectional substitution
Undergraduate	CBE362	Bioinformatics	BiS438	Bioinformatics	Unidirectional substitution
Undergraduate	CBE404	Physical Chemistry for Chemical and Biomolecular Engineers II	CH211	Physical Chemistry I	Unidirectional substitution
Graduate	CBE567	Metabolic Engineering	BiS622	Metabolic Engineering	Unidirectional substitution
Graduate	CBE653	Mechanical Properties of Polymers	MAE633	Mechanical Behavior of Polymeric and Composite Materials	Unidirectional substitution
Graduate	CBE712	Surface Phenomena	MS654	Surface Science	Unidirectional substitution
Graduate	CBE861	Special Topics in Biochemical Engineering	BS760	Selected Topics in Environmental Biotechnology	Unidirectional substitution

- ※ Students cannot take both courses to be substituted and courses to be recognized. For example, students can only take either [CBE203] Industrial Organic Chemistry or [CH221] Organic Chemistry I.
- ※ If you have taken [CH213] Physical Chemistry II and [CBE303] Physical Chemistry for Chemical and Biomolecular Engineers I, or [CH211] Physical Chemistry I and [CBE404] Physical Chemistry for Chemical and Biomolecular Engineers II in 2013 or before, credits from both courses can be counted in the graduation credits.
- ※ Substitute courses may differ according to the effective year of the requirements.