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Undergraduate Program for the Specialty of Resources Circulation Science and Engineering

I Educational Objectives

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The program is designed to graduate cross-disciplined and multiple engineers for engineering technology and engineering management who will have firmer theories and practice foundation of Chemistry and Resources Circulation Science and Engineering, familiarize the multi-directional resource cycle of resources-products-renewable resources-products and the regularity of economic sustainable development, master the knowledge of circular economy, cleaner production, comprehensive utilization of secondary resources, and resource recycling planning and management, acquire the ability to solve the science and engineering problems of comprehensive utilization of resources and environmental protection, can accomplish the work in the field of resource recycling science and engineering, such as scientific research, engineering technology development, process design, industrial management, resource planning and evaluation, et al. Graduates can be engaged in the work of planning, design, engineering construction, evaluation, management, education, and scientific research in the field of the Resources Circulation Science and Engineering in government departments, planning departments, economic management departments, environmental protection departments, design departments, industrial and mining enterprises, research institutes, and universities and so on. Also the graduates can go further study in domestic and foreign scientific research institutions or universities of similar disciplines.

II Cultivation Standards

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Length of Schooling

Duration: 4 years

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Degree

Degrees conferred: Bachelor of Engineering

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Basic requirements for Cultivation

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According to the requirements of the educational objectives and characteristics of Resource Circulation Science and Engineering, the graduates should meet the following 12 outcomes after the training program of the humanities and social science courses, engineering foundation courses, professional foundations, major courses, lectures, social activities, cultural activities, competitions, practice, teaching, counseling, seminars and other teaching activities:

1 Engineering Knowledge: Master the necessary basic theories and basic knowledge of Resource Circulation Science and Engineering, and have the ability to apply the needed basic knowledge of mathematics, natural science and engineering to solve complex engineering problems. Can be engaged in the work of scientific research, engineering technology development, process design, industrial management and policy consulting in the field of Resource Circulation Science and Engineering.

2 Problem Analysis: Apply the basic principles of mathematics, natural science and engineering science to identify, express, and analyze the complex engineering problems of this major. Obtain impactful conclusions after literature research.

3 Design/Development Solutions: Has the ability to design solutions for the complex engineering problems in this field; acquire the ability to design a system solution, components and processes that meet specific needs in this area which should take consideration of factors of society, health, safety, law, culture, environment and so on with innovative ideas.

4 Research: Master the scientific principle and engineering theory of resource recycling, acquire the analysis method and construction method of resource recycling, and be able to study the complex engineering problems of this specialty; have the ability to design and implement engineering experiments in this specialty field, and get impactful and reasonable conclusion based on the analysis and interpretation of experimental data.

5 Modern Tools Usage: Develop, select and use appropriate technology, resources, modern engineering tools and information technology tools to solve the complex engineering problems, including prediction and simulation of complex engineering problems, and understand their limitations.

6 Engineering and Society: Has the ability to conduct a reasonable analysis based on the

background knowledge of resource recycling, evaluate the impact of engineering practice and solutions for complex engineering problem on society, health, safety, law and culture, and understand the bearing responsibilities.

7 Environment and Sustainable Development: Understand and evaluate the impact of engineering practices for complex engineering problems on the sustainable development of resource, environment and society.

8 Professional Norms: Has good humanities literacy, strong sense of social responsibility, Understand and abide the engineering professional ethics and norms in the relevant engineering practice, and fulfill the corresponding responsibilities.

9 Individuals and Teams: Act as individuals, team members and leaders in a multidisciplinary team, such as chemistry, metallurgy, environment, mining, materials and information.

10 Communication: Has the ability to effectively communicate with colleagues and the public on complex engineering issues, including writing and designing reports, presenting speeches, clearly expressing or responding to instructions. Communicate with different persons who have cross-cultural background in an international perspective.

11 Project management: Understand and master the principles of engineering management and economic decision-making methods, and apply that in multi-disciplinary, such as chemistry, metallurgy, environment, mining and materials.

12 Lifelong learning: Has a correct understanding of lifelong learning and the ability to continuously learn and adapt to the development of society.

III Graduation requirement realization matrix

	1	2	3 /	4	5	6	7	8	9	10	11	12
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	H			H								
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	1	2	3 /	4	5	6	7	8	9	10	11	12
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&	H				M							
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	1	2	3 /	4	5	6	7	8	9	10	11	12
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	H						M					
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	H											
				H								
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		H	H			M	M					
		H							H		L	
						H		L	M	L		
						H			H	L		
		H						L		H	L	
		H	H	H		M				M		M
		H	H	H					M		L	M
		H	H			M		H	H		H	H

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IV Core Courses

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Introduction to Ethnic Resources and Engineering, Descriptive Geometry & Engineering Drawing, Inorganic Chemistry, Analytical Chemistry, Organic Chemistry, Physical Chemistry, Biochemistry, Resource Microbiology, Chemical Engineering, Chemical Reaction Engineering, Resource Processing and Equipment, Metallurgical Engineering, Disposal and Reuse of Solid Waste, Separation Engineering, Chemical Safety and Environmental Protection, Recycling Economy and Clean Production.

V Main Internship and Practical Training

Experiments of Chemical Engineering, Experiments of Resource Recycling Science and Engineering, Chemical Engineering Principle Design, Resource Recycling Science and Engineering Design, Metalworking Practice, Knowledge Acquirement, Producing Practice, Graduation Project, Innovation & Entrepreneurship.

VI Hours/Credits

Table of Hours and Credits

<table>
<tr><th colspan="2" rowspan="2">Courses Classified</th><th rowspan="2">/
Period/Weeks</th><th colspan="3">Credits</th><th rowspan="2">Proportion of Credits</th></tr>
<tr><th>Theory</th><th colspan="2">Practice</th></tr>
<tr><td rowspan="2">General Courses Platform</td><td>General Compulsory</td><td>890</td><td>28</td><td colspan="2">11</td><td>22.7%</td></tr>
<tr><td>General Elective</td><td>192</td><td>12</td><td colspan="2"></td><td>7.0%</td></tr>
<tr><td rowspan="2">Basic Courses Platform</td><td>Compulsory</td><td>960</td><td>41</td><td colspan="2">7</td><td>27.9%</td></tr>
<tr><td>Elective</td><td></td><td></td><td colspan="2"></td><td></td></tr>
<tr><td rowspan="2">Major Courses Platform</td><td>Compulsory</td><td>704</td><td>29</td><td colspan="2">7.5</td><td>21.2%</td></tr>
<tr><td>Elective</td><td>608</td><td>7</td><td colspan="2">1</td><td>4.7%</td></tr>
<tr><td rowspan="2">Practical Teaching Platform</td><td>Compulsory</td><td></td><td></td><td colspan="2">23.5</td><td rowspan="2">13.9%</td></tr>
<tr><td>Elective</td><td></td><td></td><td colspan="2"></td></tr>
<tr><td rowspan="2">Innovation and Entrepreneurship Platform</td><td colspan="2">Innovation Credits</td><td colspan="3">3</td><td rowspan="2">2.9%</td></tr>
<tr><td colspan="2">Entrepreneurship Credits</td><td colspan="3">2</td></tr>
<tr><td rowspan="2">Amount</td><td>Compulsory Credits</td><td>152</td><td>Elective Credits</td><td>20</td><td>Proportion of Elective Credits</td><td>11.6%</td></tr>
<tr><td>Theory Credits</td><td>117</td><td>Practice Credits</td><td>55</td><td>Proportion of Internship and Practical Training</td><td>32%</td></tr>
<tr><td colspan="3">The Lowest Graduate Credits</td><td colspan="4">172</td></tr>
</table>

Division of Credits of Each Term

Division of Credits of Each Term / Courses Classified		Term							
		1st	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**
General Courses Platform	General Compulsory	9.5	10	7	6	5	1	0.5	
	General Elective suggestive		2	2	2	2	2	2	
Basic Courses Platform	Compulsory	14	12.5	16.5	5				
	Elective								
Major Courses Platform	Compulsory				10.5	16.5	9.5		
	Elective						4.5	3.5	
Practical Teaching Platform	Compulsory		0.5	1	1	2	2	3	14
	Elective								
Amount		23.5	25	26.5	24.5	25.5	19.5	9	14
Innovation and Entrepreneurship Platform	Innovation Credits	3							
	Entrepreneurship Credits	2							
The Lowest Graduate Credits		**172**							

VII Teaching Schedule Form

/ Form I:General Course Platform

A /Form I (A):General Compulsory Courses (General Required)

Course Code	Course Names	Crs.	Hrs.	Period Classification				Semester	Notes
				The.	Exp.	Pra..	Ueb		
109100000418	Military Theory	2	36	32				1	1-18
109110000318	Military Skills Training	0/2	36			36		1	1-2
/	National Security Education	1	32	32				1	/
20W100000613	1 English 1	2	32	32				1	4-11
218110000313	1 Physical Education 1	0/1	26			26		1	4-15
209100031018	Computer Base	1/0.5	32	16	16			1	
217100012418	Cultivation of Morals and Fundamentals of Law	2.5/0.5	52	40		12		2	4-17/1-14
217100000413	Situation and Policy	2	32	32		0		2	1-16
225100000118		1.5/0.5	36	24		8		2	1-8
20W100000713	2 English 2	2	32	32				2	1-8/9-16
218110000213	2 Physical Education 2	0/1	32			32		2	1-16
20W100000813	3 English 3	2	32	32				3	1-8/9-16
218110000413	3 Physical Education 3	0/1	32			32		3	1-16
2171000122	Essentials of China Modern and Contemporary History	2.5/0.5	52	40		12		3	1-14
112110010718		1	16			16		3	1-16

Course Code	Course Names	Crs.	Hrs.	Period Classification				Semester	Notes
				The.	Exp.	Pra..	Ueb		
	Labor Education								
217100012318	Marxist Fundamentals	2.5/0.5	52	40		12		4	1-14
20W100000913	4 English 4	2	32	32				4	1-8/ 9-16
218110000113	4 Physical Education 4	0/1	32			32		4	1-16
2171000121	Introduction to MAO zedong Thought and Socialist Theoretical System with Chinese Characteristics	4/1	88	64		24		5	1-16
115100000113	Employment Guidance	1	16	16				6	1-8/ 9-16
/		0/0.5	16			16		7	1-16
: 39 Demand of Credits: Credits: 39									

B /Form I (B): General Elective Courses

Course Classi-fied	Crs.
General Elective Courses	12

Form II. Basic Course Platform

Course Classi-fied	Numbers of courses	Course Names	Crs.	Hrs.	Period Classification				Semester	Notes
					The.	Exp.	Pra.	Ueb		
Require Basic Courses	2241000066	Introduction to Ethnic Resources and Environmental Protection	1.5	24	24				1	
	213100035618	B Z Inorganic Chemistry (B) Z	3	48	48				1	
	213110035818	C Inorganic Chemistry Experiments (C)	0.5	16		16			1	
	213103005213	B Analytical Chemistry (B)	2	32	32				1	
	213110036418	B Analytical Chemistry Experiments (B)	1	32		32			1	
	2101000113	A(1) Higher Mathematics A (1)	4	80	64			16	1	
	2101000118	Linear Algebra	2	48	32			16	1	
	210102000413	A(2) Higher Mathematics A (2)	5	96	80			16	2	
	211100011118	B(1) College Physics B (1)	3	56	48			8	2	
	211112000113	B(1) University Physics B(1) Experiments	0.5	16		16			2	
	2241000067	Engineering Surveying	2	32	32				2	
	224100000913	& Descriptive Geometry & Engineering Drawing	2	32	32				2	

Course Classi-fied	Numbers of courses	Course Names	Crs.	Hrs.	Period Classification				Semester	Notes
					The.	Exp.	Pra.	Ueb		
	2101000112	Probability Theory and Mathematical Statistics	2.5	56	40			16	3	
	211100011218	B(2) College Physics B (2)	2	40	32			8	3	
	211112000213	B(2) University Physics B(2) Experiments	0.5	16		16			3	
	213100035218	C Organic Chemistry (C)	3	48	48				3	
	213110036118	B Organic Chemistry Experiments (B)	1	32		32			3	
	213100034518	B Physical chemistry (B)	3.5	56	56				3	
	213110034618	Physical Chemistry Experiments	1	32		32			3	
	2241000070	Electronic Engineering	2.5	40	40				3	
	2241100071	Electronics and Electrotechnics Experiments	0.5	16		16			3	
	2241000073	Modern Environmental Analysis	2	32	32				4	
	2241100074	Experiments of Modern Environmental Analysis	1	32		32			4	
	209100030818	Python Python Language Programming	1/1	48	16		32		4	
			: 48		48			0		
		Demand of Credits:	Credits:48		Required:48			Elective: 0		

Form III: Major Courses Platform

Course Classified	Course Code	Course Names	Crs.	Hrs.	Period Classification				Semester	Notes
					The.	Exp.	Pra.	Ueb		
Required Courses	224100013818	A1 Chemical Engineering A1	3	48	48				4	
	224110014018	A1 Experiments of Chemical Engineering A1	1	32		32			4	
	224100019818	Chemical Reaction Engineering	2	32	32				4	
	224100019918	Ore Science	1.5	24	24				4	
	224100020018	Resource Microbiology	2	32	32				4	
	224110015318	Experiments of Resource Microbiology	1	32		32			4	
	224100013918	A2 Chemical Engineering A2	3	48	48				5	
	224110014118	A2 Experiments of Chemical Engineering A2	1	32		32			5	
	224100014318	CAD Chemical CAD	1	16	16				5	
	224110014418	CAD Experiments of Chemical CAD	1.5	48			48		5	
	224100014518	Resource Processing Process and Equipment	3	48	48				5	
	224110014618	Experiments of Resource Processing Process and Equipment	1	32		32			5	

Course Classi-fied	Course Code	Course Names	Crs.	Hrs.	Period Classification				Semester	Notes
					The.	Exp.	Pra.	Ueb		
	224100014718	Chemical Engineering Thermodynamics	3	48	48				5	
	224100014818	Metallurgical Principle	3	48	48				5	
	224100014918	Disposal and Reuse of Solid Waste	2	32	32				6	
	224110015018	Experiments of Disposal and Reuse of Solid Waste	1	32		32			6	
	224100015118	B Environmental Engineering	2	32	32				6	
	213113019613	Experiments of Environmental Engineering	1	32		32			6	
	224100015418	Separation Engineering	2	32	32				6	
	224101006013	Clean Production and Recycling Economy	1.5	24	24				6	
Elective courses	213103021513	B Environmental Monitoring (B)	2	32	32				5	8
	224100019518	Professional English for Resource Recycling Science and Engineering	1.5	24	24				6	5 6
	224100015718	Solid Waste Disposal and Ecological Materials	1.5	24	24				6	4.5 7
	224100018318	Biochemistry	2	32	32				6	3.5
	213103029713	Environmental Plans and Management	2	32	32				6	

Course Classi-fied	Course Code	Course Names	Crs.	Hrs.	Period Classification				Semester	Notes
					The.	Exp.	Pra.	Ueb		
	224100015818	Fundamental Chemical Process Equipment	2	32	32				6	
	224100015918	Crystallography and Industrial Crystallization	2	32	32				6	
	/	Remote Sensing Technology and Application	2	32	32	0			6	
	2241000078	Literature Retrieval and Scientific Paper Writing	1.5	32	16	16			7	
	224100016118	Resource Recycling Processing Plant Design	1.5	24	24	16			7	
	224100015518	Chemical Safety and Environmental Protection	2	32	32				7	
	224100016218	Chemical technology	2	32	32				7	
	224100016318	Biochemical Separation Engineering	1.5	24	24				7	
	2241000100	Polymer Chemistry and Physics	2	32	32				7	
	2241000098	Recycling Technology of Waste Electrical and Electronic Equipment	2	32	32				7	
	2241000105	Biomass Conversion and Utilization	2	32	32				7	
	224100016418	Ecology	2	32	32				7	

Course Classi-fied	Course Code	Course Names	Crs.	Hrs.	Period Classification				Semester	Notes
					The.	Exp.	Pra.	Ueb		
	224100016518	Principle and								