

China University of Geosciences

**Training Program of Academic Master's
Degree**

First-level Discipline Code	0818
Discipline	Geological Resources and Geological Engineering

Graduate School of China University of Geosciences

June 15, 2023

I. Discipline Introduction

Geological Resources and Geological Engineering is one of the oldest and strongest first-level doctoral programs in CUG. It has been ranked number one in all discipline evaluations in China. In 2017 and 2022, this discipline was respectively awarded A+ discipline, and was successfully included in the “Double World-Class Project”.

Geological Resources and Geological Engineering, closely linked to social and economic sustainability, is a discipline that studies the exploration, evaluation, development and utilization of geological bodies. The advancement of this discipline can not only provide the most fundamental material conditions for the development of social productivity, but also pave the way for industrial and agricultural construction. Therefore, playing a pivotal role in national economic construction, this discipline is closely intertwined with social development and human survival, and is an important discipline with great development potential.

CUG is among the first universities or colleges that were approved doctoral and master’s programs of Geological Resources and Geological Engineering by Ministry of Education of China. Under the first-level discipline of Geological Resources and Geological Engineering, CUG offers three second-level disciplines: Mineral Survey and Exploration, Earth Exploration and Information Technology, and Geological Engineering. Additionally, in accordance with the educational characteristics of CUG, we offer four second-level disciplines under first-level disciplines, including Resource Industry Economics, Geosciences Information Engineering and Geological Equipment Engineering. Targeting national strategic needs in the fields of mineral resources, energy, and major geological engineering issues, this discipline aims to achieve world-class status in talent cultivation and scientific research in the field of geological resources and geological engineering. By conducting cutting-edge and innovative basic and applied research with a focus on international scientific and technological frontiers, we seek to produce original research findings that meet the highest international standards. Our ultimate goal is to nurture top-notch innovative talents in this field.

This discipline boasts 278 full-time teachers, including 110 professors and 76 doctoral supervisors. Among these professors, there are two academicians of the Chinese Academy of Sciences, one National Distinguished Teacher, one National Model Teacher, four winners of Distinguished Young Scholars of NSFC, four Changjiang Distinguished Scholars of the Minister of Education, one Chief Scientist of the National 973 Program, two winners of Excellent Young Scholars of NSFC, two members of the National Thousand Talents Program and one member of Millions of Talents Program. There are two national teaching teams, two innovation teams of the Ministry of Education, and five other innovation groups or teaching teams at provincial and ministerial levels. In the discipline, the School has four national and 15 provincial and ministerial research and teaching platforms, including the State Key Laboratory of Geological Processes and Mineral Resources, the Hubei Badong National Field Scientific Observation and Research Station for Geological Disasters, the International Science and Technology Cooperation Base for Geological Engineering, and the International Joint Research

Center for Deep Earth Drilling and Deep Earth Resources Development. Since 2018, eight major national scientific research projects have been undertaken and three national scientific research and teaching awards were granted.

This discipline has become the key hub in China for cultivating high-level talents in the fields of mineral exploration and quantitative prediction, geological engineering, geophysical exploration, geo-information technology, unconventional resources/energy exploration and other fields. Up to now, this discipline has trained thousands of Master's and doctoral students, most of whom have become the backbones of China's geological resources and geological engineering, and a large number of academic elites and outstanding professionals have emerged, represented by academicians such as Tang Zhongli, Ouyang Ziyuan, Jin Zhenmin, Ma Yongsheng, Jin Zhijun, Li Jiabiao, Hao Fang, Wu Qiang and so on.

II. Discipline Research Directions and Characteristics

NO.	DISCIPLINE RESEARCH DIRECTION	MAIN RESEARCH FIELDS, CHARACTERISTICS AND ADVANTAGES	DISCIPLINE LEADER AND ACADEMIC BACKBONES
1	Mineral Survey and Exploration	This direction focuses on various solid mineral and fluid mineral resources, including theoretical, technical, and methodological aspects of mineral resource prediction, exploration, evaluation, and development. Optimizing the comprehensive benefits of geology, resources, environment, technology, and economy, this direction aims to cultivate high-level geological and mining technology talents for national economic construction, technological progress, and sustainable development in the 21st century. The main research areas include: mineral exploration theory and method, deep mineralization information mining and prospecting, mathematical model and application of mineral exploration, quantitative prediction and evaluation of resources, basin analysis and simulation, geostatistics in mineral exploration, oil-forming system and reservoir-forming dynamics, petroleum structure analysis,	Discipline Leader: Li Jianwei Academic Backbones: Jiang Shaoyong, Wang Hua, Jiao Yangquan, Zhuang Xinguo, Wang Shengwei, Yan Detian, Chen Honghan, He Sheng, Mei Lianfu, Shen Chuanbo, Shi Wanzhong, Ye Jiaren, Zhu Hongtao, Lu Xinbiao, Wei Junhao, Zhang Jun, Zhao Kuidong, Zhao Xinfu, Zuo Renguang, Li Jing,

		<p>oil and gas geochemistry, reservoir modeling, reservoir sedimentology, metallogenic law and quantitative prediction, prediction theory on mineralization of large-super large deposits, etc.</p>	<p>Chen Si, Liu Qianghu, Zhu Gangtian, Xu Shang, Ma Benben, Li Shuifu, Zhang Shulin, Zhao Yanchao, Zhou Jiangyu, Yang Xianghua, Li Huan, Gan Huajun, Wu Liqun, Wang Xiaomei, Wang Xiaoming, Rong Hui, Li Guoqing, Huang Chuanyan, Guo Xiaowen, Hou Yuguang, Hu Shouzhi, Li Chunquan, Liu Jianzhang, Liu Zhaoqian, Ping Hongwei, Teng Changyu, Wang Furong, Xu Sihuang, Liu Xiaofeng, Cao Qiang, Ding Zhenju, Fu Lebing, He Mouyin, Hu Xinlu, Li Yanjun, Li Zhanke, Pi Daohui, Sun Huashan, Tan Jun, Wang Minfang, Xu Yaoming, Yang Meizhen, Yang Zhen, Zhang Jinyang,</p>
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			Wei Qirong, Zhang Xiaojun, Zhang Keqing, Yao Chunliang, and Wu Chunming
2	Earth Exploration and Information Technology	The doctoral program in Geophysical Exploration is distinguished by its emphasis on the research of theories, methods, and technologies in applied geophysics, on environmental and engineering geophysics, and exploration of resources and energy. The direction places particular emphasis on the utilization of new physical principles and parameters and on methodological innovations. Additionally, it highlights the application of theories on modern digital signal processing and the application of computer science in the field of geophysics, and highlights the use of geophysical methods to address issues encountered in basic theory development of geosciences and the use in contribution to national economic development. The main research areas include: resource and energy geophysics, geophysical data processing and forward/inverse modelling, modern geophysical information processing, oil and gas reservoir geophysics, geophysical logging, and near-surface geophysics. The direction of Earth information technology of this discipline is characterized by the intersection of information technologies, such as geographic information system, remote sensing, and spatial data mining, with traditional geology. The main research areas include: mathematical geology, remote sensing geology, mineral resource evaluation, geological process	Discipline Leader: Hu Xiangyun Academic Backbone: Gu Hanming, Zhu Peimin, Deng Shikun, Shi Xueming, Wang Shuming, Song Xianhai, Cai Hongzhu, Zhang Lele, Lin Kai, Zhang Shihui, Ma Huolin, Liu Shuang, Yan Zhe, Yang Yushan, Wang Limin, Peng Ronghua, Liu Ying, Wang Lingling, Zhang Henglei, Cai Chengguo, Bao Xiaohuan, Luo Miao, Yan Zhe, Wang Limin, Yu Changpeng, Wei Wei, Wang Yufeng, Xu Shan, Zeng Fuqiang, Jin Song, Bian Aifei, Li Shuai,

		simulation, etc.	<p>Xue Jiao, Chai Xintao, Fu Lei, Zeng Zhiwei, Li Jianhui, Zhang Wenbo, Wang Liping, Niu Ruiqing, Wang Yi, Zhang Zhi, Wang Xianmin, Wu Ke, Chen Lixia, Chen Tao, Dong Yanni, Huang Qian, Wu Xueling, Xu Lina, Yang Yetao, Yu Xin, Zhang Yuxiang, Chen Jianguo, Xia Qinglin, Zhang Zhenfei, Wang Xinqing, Xu Yuanjin, Mei Hongbo, Wang Xueping, Zhang Jie, and Zhao Jiangnan</p>
3	Geological Engineering	<p>Centered around theories and technical methods of geological engineering, this direction focuses on studies of geomaterial and rock mechanics, engineering geological characteristics, drilling technology, and technology of underground facility construction for engineering construction in polar or high-altitude areas and for engineering construction under such environmental conditions as freezing and thawing, earthquakes, and hurricanes. This direction also involves research on the</p>	<p>Discipline Leader: Tang Huiming Academic backbone: Jiang Guosheng, Ning Fulong, Yin Kunlong, Hu Xinli, Dou Bin, Wang Liangqing, Li Changdong, Gong Wenping, Liu Tianle,</p>

		<p>rock mechanics of drilling and mining unconventional oil and gas, geothermal resources, and hot dry rocks, and processing technologies and experimental technologies of analyzing and testing these resources. Besides, this direction is aimed at studies on protective materials of new rock-soil mass, foundation reinforcement and treatment materials, pavement materials in special environments, engineering structure protection and fire prevention materials, drilling (well) materials, etc. The main research areas include: prediction and prevention of geological disasters, numerical simulation of engineering geology, prediction and risk management research of geological disasters, research of landslide stability, drilling and drilling engineering, basic engineering, exploration and development of unconventional energy, theories and technologies of trenchless engineering, etc.</p>	<p>Wu Yiping, Duan Longchen, Xu Guangli, Li Yunan, Yan Echuan, Hu Yule, Pan Bingsuo, Wang Yang, Cai Jihua, Luo Xuedong, Zhang Guangcheng, Lu Chunhua, Zhang Ming, Wu Wenbing, Li Deying, Zhou Jiaqing, Luo Jin, Ge Yunfeng, Jian Wenxing, Tang Zhaohui, Jia Hongbiao, Ma Shuzhi, Teng Weifu, Xiong Chengren, Hu Xiuwen, Chen Jianwen, Cui Deshan, Zhang Yongquan, Huang Shenggen, Zhang Jiaming, Xiang Xianchao, Zhang Ling, Wang Rongjing, Gao Hui, Zheng Mingyan, Zeng Cong, Lu Hongzhi, Zhang Tao, Tian Hong, Ou Wenjia, Zheng Jun, Lei Gang, He Zhongjin, Cheng Wan,</p>
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			Fang Xiaohong, Liang Rongzhu, Liu Xiao, Liu Qingbing, Wang Jinge, Zou Zongxing, Zhang Shu, Ma Junwei, and Li Yuanyao
4	Resource Industry Economy	This direction primarily focuses on issues related to the industrial allocation, techno-economic assessment, arrangement of property rights system, the relationship between population, resources, environment and socio-economic development, as well as strategies of sustainable development of mineral resources. This direction has also developed its own distinctive features in areas such as the techno-economic assessment of mineral resources, mineral resources planning, mining right system, mining organization, etc.	Discipline Leader: Jinhua Cheng Academic backbones: Yang Shuwang, Wu Qiaosheng, Xiao Jianzhong, Cheng Sheng, Xu Deyi, Zhu Dongyuan, Tang Shangying, Deng Hongbing, Li Tongping, Zhang Wei, Bai Yongliang, Jin Gui, Yi Ming, Guo Mingjing, Li Qiming, Liu Jiangyi, Wang Laifeng, Qi Rui, Zhang Huan, Zhang Yixiang, Hong Shuifeng, Wang Deyun, Gong Chengzhu, Zhu Yali, Chen Yan, and Xu Xiang
5	Geoscience Information Engineering	This direction is an emerging interdisciplinary field that integrates Computer Science, Information	Discipline Leader: Lizhe Wang Academic

	<p>Technology, and Earth Sciences. It aims to cultivate high-quality talents in all-round development of research and development technology, who are expected to serve the informatization of China's geology and mineral resources. This discipline explores pathways and methods that integrate learning and optimization to address scientific research problems by leveraging cutting-edge developments in intelligent computing and machine learning. This direction also includes studies on theories and methods for processing large-scale nonlinear data, modeling and analysis methods for complex systems, as well as high-performance processing techniques and applications for geoscience big data. In addressing complex spatial tasks such as the integrated system structure and collaborative applications of Earth and space, this direction involves designing task-solving algorithms and evaluating them from the perspectives of system performance, global optimization, and engineering reliability. It also includes studies on the theoretical foundations, methods, and technological systems of geological information science, as well as research and development methods for geological information systems. Furthermore, this direction encompasses research on technical methods and development of application system for the "Glass Earth" and geological big data. The research findings of this discipline may provide extensive support to national innovation and industry digitalization strategies.</p>	<p>backbone: Zhang Hongyan, Liu Gang, Cai Zihua, Dai Guangming, Xie Zhong, Hu Chengyu, Chen Zhanlong, Chen Yunliang, Zeng Deze, Li Jun, Tian Yiping, Zhang Xialin, Zhang Dongmei, Chen Qiyu, He Zhenwen, Dong Yusen, Li Zhanglin, Zhang Zhiting, Shao Yuxiang, Li Xinchuan, Zhang Junqiang, Wang Xiaofeng, Jiang Liangxiao, Gong Wenyin, Zuo Boxin, Yan Xuesong, Ge Fudong, Tang Chang, Liu Yuanyuan, Wang Maocai, Li Hui, Zhao Man, Peng Lei, Song Zhiming, Chen Xiaoyu, Luo Hui, Zhou Mengyun, Zhou Shunping, Shang Jianga, Wan Bo, Wu Liang, Guo Mingqiang, Li Shengwen,</p>
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			Cheng Qing, Chen Weitao, Kong Chunfang, Feng Ruyi, Zhao Ji, Li Xianju, and Chen Yifu
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III. Training Objectives and Duration of Study

Training Objectives:

The talent training in this discipline always adheres to the guiding principle of “satisfying the major national needs and focusing on the frontiers of international Earth sciences and technologies”. Students are expected to be meticulous in scientific research with strong innovative abilities. They are expected to lay a solid foundation in basic science and theoretical knowledge of Earth Sciences, and to systematically acquire solid professional basic knowledge related to geological resources and geological engineering. Furthermore, students are expected to be familiar with the frontiers of scientific and technological development in this discipline and be able to identify, analyze and solve problems in practical work. Therefore, they can establish themselves as high-level engineering professionals who are competent to solve major engineering and technological problems by skillfully applying advanced geoscientific theories as well as the methods and techniques of geological survey, exploration, drilling and evaluation. The specific requirements are as follows:

1. Students are expected to have a strong sense of innovation, active academic thinking, and careful logical thinking. They should also lay a broad theoretical foundation and solid professional knowledge. They also are encouraged to explore new frontiers and achieve creative findings, with teamwork spirit, innovation and trailblazing efforts.
2. Students are expected to obtain excellent language and writing skills, and are capable of expressing themselves orally and complete academic papers and works in a proficient, accurate and normative way. They should show proficiency in reading professional materials in this discipline, and show competence of publishing high-level academic papers.

Duration of Study:

A flexible duration of study is offered. For academic master’s degree students, the basic duration of study is three years with a maximum of five years. Within the basic length, students can apply for graduation up to one year ahead of schedule.

IV. Must-read Classic Monographs, Academic Journals, and Professional Websites

5-1 081801 Mineral Resource Prospecting and Exploration

No./Name of Work or Journal/Author or Publisher
Must-read Classic Monographs:
1. Zhao, P. (2006). Theories and Methods for Mineral Exploration. China University of Geosciences Press.
2. Li, S., et al. (2006). Mineral Exploration (2nd ed.). Geology Press.
3. Fan, Y., et al. (2005). Metallogenic Regularity and Prediction. China University of Mining and Technology Press.
4. Lu, Z., et al. (1989). Metallogenic Regularity and Prognostics. China University of Geosciences Press.
5. Wang, S. (2002). Theories and Methods of Comprehensive Information Mineral Prediction. Science Press.
6. Development and Research Center of China Geological Survey. (2011). World Prospecting Model and Mineral Exploration. Geology Press.
7. Ore Deposit Modeling and Mineral Prospecting. The conference materials of the 2010 short-term training course on ore deposit modeling and mineral prospecting at China University of Geosciences, Wuhan (Volumes I, II)
8. Cox D. P., & Singer, D. A., eds. (1986). Mineral deposit models. U.S. Geological Survey Bulletin.
9. Pei, R. (1995). Models of Mineral Deposits in China. Geology Press.
10. Cao, X., et al. (2008). Research on Effective Methods and Approaches of Rapid Evaluation of Potential Concealed Deposits (Ore Body) Prospecting. China University of Geosciences Press.
11. Jiang, J. (2006). Applied Geochemistry. China University of Geosciences Press.
12. Liu, T. (2007). Introduction to Geophysical Exploration. Geology Press.
13. Wei, J., et al. Comprehensive Exploration Technologies. Internal Textbook of China University of Geosciences.
14. Zhao, P., et al. (1994). Statistical Prediction of Mineral Deposits. Geology Press.
15. Zhai, Y., et al. (1993). Mine Field Tectonics. Geology Press.
16. Zhai, Y., et al. (1999). Regional Metallogeny. Geology Press.
17. Zhai, Y. (2010). Theory of Metallogenic Systems. Geology Press.
18. Chen, G., et al. (1987). Genetic Mineralogy and Prospecting Mineralogy. Chongqing Publishing Group.
19. Tu, G., et al. (2000). Superlarge Mineral Deposits in China. Science Press.
20. Zhai, Y., et al. (2002). Metallogenic Systems in Paleocontinental Margin. Geology Press.
21. Zhai, Y., et al. (2008). Formation Mechanism and Structural Characteristics of Metallogenic Series in China. Geology Press.
22. General Requirements for Mineral Exploration. The National Standard of the

- People's Republic of China, GB/T 13908-2002
23. Yuan, H. (2004). Mining Right Evaluation: An Introduction to Theories, Methods, and Parameters. China Land Press.
 24. Revision Group of Guide to Mining Right Evaluation. (2006). Guide to Mining Right Evaluation (2006 Revised Edition), China Land Press, 200.
 25. Applied Sedimentology. Internal textbook of China University of Geosciences, Wuhan
 26. Sequence Stratigraphy and Prediction of Subtle Traps. (2008). China University of Geosciences Press.
 27. Fundamentals and Applications of Sedimentary Basin Analysis. (2004). Higher Education Press.
 28. A Handbook of Coalbed Methane Development and Utilization. (1998). China Coal Industry Publishing House.
 29. Su, X., et al. (2001). Coalbed Methane Geology and Exploration Development. Science Press.
 30. Coalbed Methane Geology. (2007). China University of Mining and Technology Press.
 31. Theoretical Basis of Coalbed Methane Formation Mechanism and Economic Exploitation. (2005). Science Press.
 32. Palmer, I. D., et al. (1996). Coalbed Methane Reservoir Evaluation and Production Technology. China University of Mining and Technology Press.
 33. Wang, X., et al. (1998). Case Studies on Foreign Coalbed Methane Exploration and Development. Petroleum Industry Press.
 34. Zhang, Y. (1996). Collected Translations of Foreign Coalbed Methane Gas Development Technologies. Petroleum Industry Press.
 35. Li, W., & Ma, X. (2001). New Progress in Geologic Evaluation and Exploration Technology of Coalbed Methane in China. China University of Mining and Technology Press.
 36. Coalbed Methane Development Geology. (2009). Chemical Industry Press.
 37. Coalbed Methane Reservoir Engineering. (2009). Science Press.
 38. C. K. Wilgus., et al. (1993). Principles of Sequence Stratigraphy: A Comprehensive Analysis of Sea Level Changes.
 39. Sangrce, J. B. Vail, & P. R. (1990). Applied Sequence Stratigraphy: Stratigraphic Interpretation of Seismic, Drilling and Outcrop Data.
 40. Mei, Z., et al. (1993). Sequence Stratigraphy. Northwestern University Press.
 41. Qiu, Y., et al. (1997). Oil and Gas Reservoir Evaluation Technologies. Petroleum Industry Press.
 42. Wang, X., Fei, Q., & Zhang, J. (1990). Tectonic Analysis for Petroleum Exploration. China University of Geosciences Press.
 43. Fei, Q., et al. (2001). Analysis and Modeling of Petroleum System. Higher Education Press.
 44. Zhang, K., et al. (2002). Development Strategies of China's Petroleum and Natural Gas. Geology Press, Petroleum Industry Press and China Petrochemical Press.
 45. Coalfield Teaching and Research Department, Wuhan Geological Institute. (1979).

- Coalfield Geology.
46. Yang, Q. (1981). Coal Geology of China.
 47. Qian, K., & Zhao, Q. (1997). Theory of Coalbed Methane Gas Exploration and Experimental Testing Techniques.
 48. Wang, S., & Chen, Z. (1997). Research on Rock Physics of Coal Reservoirs and Selection of Prospecting Areas for Coalbed Methane.
 49. Li, S., et al. (2004). Sedimentary Basin Analysis Principle and Application. Higher Education Press.
 50. Miall, A. D. (1991). Principles of Sedimentary Basin Analysis. Petroleum Industry Press.
 51. Li, S. (1988). Analysis of Fault Basins and Coal Accumulation Law. Geology Press.
 52. Li, S. (1996). Sedimentary Systems of Energy-bearing Basins. China University of Geosciences Press.
 53. Galloway W. E. and Hobday D. K. (1989). Continental Margin Clastic Sedimentary Systems— Application to Petroleum, Coal, and Uranium Exploration.
 54. Li, S., et al. (1999). Basin Dynamics— Basic Ideas and Several Research Methods. China University of Geosciences Press.
 55. Frostick L. E. and Steel, R. J., et al. (1996). Tectonic Control and Characterization in Sedimentary Sequences.
 56. Hao, F., et al. (2005). Dynamics of Hydrocarbon Generation and Accumulation Mechanisms in Overpressured Basins. Science Press.
 57. Miall, A. D. (1999). Principles of Sedimentary Basin Analysis.
 58. Moores, E. M., & Twiss, R. J. (1995). Tectonics. New York □ W. H. Freeman.
 59. Hobbs, B. E., Means, W. D., & Williams, P. F. (1976). An Outline of Structural Geology. New York: John Wiley & Sons.
 60. Hunt, J. M. (1996). Petroleum Geochemistry and Geology. (2nd ed.). New York: W. H. Freeman.
 61. Tissot, B. P., & Welte, D. H. . (1984). Petroleum Formation and Occurrence (2nd ed.). Springer-Verlag.
 62. Allen, A. P. & Allen, R. J. (1990). Basin Analysis: Principles and Applications. Blackwell Scientific.
 63. James D. Lowell. (1985). Structural Styles in Petroleum Exploration. Oil and Gas Consultants International Inc.
 64. Peters, K. E. and Moldowan, J. M., Englewood Cliffs. (1993). The Biomarker Guide: Interpreting Molecular Fossils in Petroleum and Ancient Sediments. New Jersey: Prentice Hall.
 65. Magoon, Park, M. , CA (United States), W., G., Houston, & TX (United States). (1991). The Petroleum System from Source to Trap. Aapg Memoir, 14(3), 627-627.
 66. Swaine, D. J. (1990). Trace Elements in Coal. Butterworths.
 67. Lerche. (1990). Basin Analysis Quantitative Methods. Academic Press.

Journals:

1. Science China Earth Sciences. Chinese Academy of Sciences
2. Acta Mineralogica Sinica. Chinese Academy of Sciences
3. Geochimica. Institute of Geochemistry, Chinese Academy of Sciences
4. Geotectonica et Metallogenia. Institute of Geochemistry, Chinese Academy of Sciences
5. Acta Geologica Sinica. Geological Society of China
6. Geological Review. Geological Society of China
7. Acta Petrologica Sinica. Chinese Society for Mineralogy, Petrology and Geochemistry
8. Journal of Earth Science. China University of Geosciences
9. Bulletin of Geological Science and Technology. China University of Geosciences
10. Earth Science Frontiers. China University of Geosciences (Beijing)
11. Geoscience. China University of Geosciences (Beijing)
12. Journal of Chengdu University of Technology (Science & Technology Edition). Chengdu University of Technology
13. Journal of Jilin University (Earth Science Edition). Jilin University
14. Geology and Exploration. China Metallurgical Geology Bureau
15. Economic Geology. The Society of Economic Geologists
16. Mineralium Deposita. The Society for Geology Applied to Mineral Deposits
17. Geochimica et Cosmochimica Acta. The International Association of Geochemistry and Cosmochemistry
18. Geochemistry: Exploration-Environment-Analysis. The Association of Applied Geochemists
19. Geology. Geology Society of America
20. American Mineralogist. Mineralogical Society of America
21. The Canadian Mineralogist. Mineralogical Association of Canada
22. European Journal of Mineralogy. European Mineralogical Union
23. Exploration and Mining Geology. Geology Society of Canadian Institute of Mining, Metallurgy, and Petroleum
24. Reviews in Mineralogy & Geochemistry. Mineralogical Society of America Geochemical Society
25. SEG Journal. Society of Exploration
26. Asian Journal of Earth Sciences. American Geosciences Institute
27. Natural Resources Research. International Association for Mathematical Geosciences
28. Computers & Geosciences. International Association for Mathematical Geosciences
29. Advances in Geosciences. American Geosciences Institute
30. Geologic Map Series. The State of New Jersey
31. Journal of China University of Geosciences. China University of Geosciences
32. AAPG.
33. Sedimentary Geology.
34. Sedimentology.

35. Marine and Petroleum Geology.
36. International Journal of Coal Geology.
37. Chemical Geology.
38. Applied Geochemistry.
39. Earth and Planetary Science Letters.
40. Journal of Asian Earth Sciences.
41. Journal of Structural Geology.
42. Palaeogeography, Palaeoclimatology, Palaeoecology.
43. Tectonophysics.
44. Journal of China University of Mining & Technology. China University of Mining and Technology (Xuzhou)
45. Journal of China Coal Society. Chinese Institute of Coal Science
46. Journal of Liaoning Technical University (Natural Science). Liaoning Fuxin Liaoning Technical University
47. Coal Geology & Exploration. Xi'an Research Institute of China Coal Technology Engineering Group
48. Uranium Geology. Uranium Geological Branch of Chinese Nuclear Society
49. International Journal of Coal Geology.
50. Applied Energy.
51. Fuel.
52. Fuel Processing Technology.
53. Energy & Fuels.
54. Geology-Geochemistry. Institute of Geochemistry, Chinese Academy of Sciences
55. Petroleum Geology & Experiment. Sinopec Petroleum Exploration and Production Research Institute
56. Acta Petrolei Sinica. Chinese Petroleum Society
57. Oil & Gas Geology. Sinopec Petroleum Exploration and Production Research Institute
58. Petroleum Exploration and Development. Research Institute of Petroleum Exploration and Development
59. Natural Gas Industry. Sichuan Petroleum Administration Bureau
60. Acta Sedimentologica Sinica. Sedimentology Professional Committee of Chinese Society for Mineralogy, Petrology and Geochemistry
61. Oil Geophysical Prospecting. Bureau of Geophysical Prospecting INC. China National Petroleum Corporation
62. Geophysical Prospecting for Petroleum. Sinopec Petroleum Exploration and Production Research Institute
63. Natural Gas Geoscience. Scientific Information Resources and Environment Science and Data Center, Chinese Academy of Sciences
64. China Petroleum Exploration. Petroleum Industry Press
65. Well Logging Technology. CNPC Logging
66. Petroleum Drilling Techniques. SINOPEC Research Institute of Petroleum Engineering
67. Well Testing and Production Technology. Development Department of SINOPEC

- Star Petroleum Corporation
68. Organic Geochemistry.
 69. Applied Geochemistry.
 70. Petroleum Geosciences.
 71. Journal of Petroleum Geology.
 72. Journal of Sedimentary Petrology.
 73. Tectonics.
 74. Bulletin of Canadian Petroleum Geology.
 75. Journal of Petroleum Technology.
 76. SPE reservoir Evaluation & Engineering.
 77. Oil Shale.
 78. SPE Journal.
 79. The Geophysics.

Professional Websites

Foreign Language Database

1. AAPG (American Association of Petroleum Geologists Annual Meeting)
<https://www.aapg.org>
2. AGU (American Geophysical Union) <https://www.agu.org>
3. Engineering Village Platform (EI) (<http://www.engineeringvillage.com/>)
4. Elsevier ScienceDirect <https://www.sciencedirect.com/>
5. International Association of Sedimentologists (IAS)
<https://www.sedimentologists.org>
6. European Geosciences Union (EGU meeting) <https://www.egu.eu/meetings/>
7. Goldschmidt conferences, Goldschmidt
<https://www.geochemsoc.org/events/goldschmidtconference>
8. International Meeting on Organic Geochemistry, IMOG
9. SPE Annual Technical Conference and Exhibition, SPE
10. Society of Exploration Geophysicists (SEG) [http://www.showsbee.com/company-6057-Society-of-Exploration-Geophysicists-\(SEG\).html](http://www.showsbee.com/company-6057-Society-of-Exploration-Geophysicists-(SEG).html)
11. Geofluids <https://www.hindawi.com/journals/geofluids/>
12. SPE Unconventional Resources Conference (SPE-URC)
<https://onepetro.org/SPEGTS/11UGC/conference/All-11UGC>
13. Web of Science <https://www.webofscience.com/>
14. GSA Annual Meeting [https:// community.geosociety.org/home](https://community.geosociety.org/home)
15. SPE OnePetro Database <https://onepetro.org/>

Chinese Databases

1. China National Knowledge Infrastructure (CNKI), <http://www.cnki.net/>
2. Wanfang Data Resource System, <http://g.wanfangdata.com.cn/index.html>
3. VIP Chinese Journal of Science and Technology, [http:// qikan.cqvip.com/](http://qikan.cqvip.com/)
4. Superstar Journal, <http://qikan.chaoxing.com/>
5. MOOC (Massive Open Online Course) of China University, <https://>

www.icourse163.org/

6. XuetangX, <https://next.xuetangx.com/>
7. Chinese Standard Full-text Database, <https://www.wanfangdata.com.cn/index.html>
8. Electronic Books of Digital Library of China, <http://idl.hbdlib.cn/>

5-2 081802 Earth Exploration and Information Technology

Must-read Classic Monographs:

1. Zhao, P. (2006). Theories and Methods for Mineral Exploration. China University of Geosciences Press.
2. Wang, S. (2002). Theories and Methods of Comprehensive Information Mineral Prediction. Science Press.
3. Development and Research Center of China Geological Survey. (2011). World Prospecting Model and Mineral Exploration. Geology Press.
4. Jiang, J. (2006). Applied Geochemistry. China University of Geosciences Press.
5. Liu, T. (2007). Introduction to Geophysical Exploration. Geology Press.
6. Tian, S., & Zhan, Q. (2013). Remote Sensing Geology. Geology Press.
7. Zhao, P., et al. (1994). Statistical Prediction of Mineral Deposits. Geology Press.
8. Zhao, P., et al. (2004). Quantitative Geo-methods and Applications. Higher Education Press.
9. Zhao, P., et al. (2019). Geodynamic Background, Process and Quantitative Evaluation of Mineralization of Large-Superlarge Deposits-Quantitative Exploration and Evaluation. Geology Press.
10. Zhou, Y., et al. (2018). Geoscience Big Data Mining and Machine Learning. Sun Yat-sen University Press.
11. Wu, C., et al. (2014). Geological Information Science and Technology Introduction. Science Press.
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Journals:

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2. Geophysical Research Letters, American Geophysical Union (AGU)
3. Reviews of Geophysics, American Geophysical Union (AGU)
4. Physics of Earth and Planetary Interior, Elsevier
5. Geophysical Journal International, Wiley
6. Journal of Geodynamics, Elsevier
7. Tectonophysics, Elsevier
8. Surveys in Geophysics, Springer

9. Tectonics, Elsevier
10. Geophysics, Society of Exploration Geophysicists (SEG)
11. Geophysical Prospecting, Wiley
12. Pure and Applied Geophysics, Springer
13. Journal of Applied Geophysics, Elsevier
14. AAPG Bulletin, American Association of Petroleum Geologists (AAPG)
15. Geology, Geological Society of America (GSA)
16. Bulletin of the Seismological Society of America, Seismological Society of America (SSA)
17. Near Surface Geophysics, European Association of Geoscientists and Engineers (EAGE)
18. Natural Resources Research, International Association for Mathematical Geosciences (IAMG)
19. Computers & Geosciences, International Association for Mathematical Geosciences (IAMG)
20. Mineralium Deposita, The Society for Geology Applied to Mineral Deposits
21. Geochimica et Cosmochimica Acta, The International Association of Geochemistry and Cosmochemistry
22. Geochemistry: Exploration-Environment-Analysis, The Association of Applied Geochemists
23. American Mineralogist, Mineralogical Society of America
24. The Canadian Mineralogist, Mineralogical Association of Canada
25. European Journal of Mineralogy, European Mineralogical Union
26. Exploration and Mining Geology, Geology Society of Canada Institute of Mining, Metallurgy and Petroleum
27. Reviews in Mineralogy & Geochemistry, Mineralogical Society of America Geochemical Society
28. SEG Journal, Society of Exploration Geophysicists (SEG)
29. Asian Journal of Earth Sciences, American Geosciences Institute
30. Advances in Geosciences, American Geosciences Institute
31. Journal of China University of Geosciences, China University of Geosciences
32. Science China (Chinese and English), Science Press
33. Chinese Science Bulletin (Chinese and English), Science Press
34. Chinese Journal of Geophysics (Chinese and English), Science Press
35. Acta Geologica Sinica (Chinese and English), Science Press
36. Progress in Chinese Natural Sciences (Chinese and English), Science Press
37. Oil Geophysical Prospecting, Editorial Department of Geophysical Prospecting for Petroleum
38. Advances in Earth Science, Science Press
39. Journal of Earth Science (Chinese), China University of Geosciences Press
40. Journal of Earth Science (English), Springer
41. Bulletin of Geological Science and Technology, China University of Geosciences Press
42. Acta Seismologica Sinica (Chinese and English), Science Press

43. Acta Scientiarum Naturalium Universitatis Pekinensis, Peking University Press
44. Journal of Jilin University (Earth Science Edition), Jilin University Press
45. Journal of Chengdu University of Technology, Chengdu University of Technology Press
46. Journal of Chang'an University (Earth Science Edition), Chang'an University Press
47. Geophysical Prospecting for Petroleum, Science Press
48. Geophysical and Geochemical Exploration, Geology Press
49. Earth Science Frontiers, Editorial Department of Earth Science Frontier, China University of Geosciences (Beijing)

Professional Websites

Foreign Language Database

1. IAMG (The International Association for Mathematical Geosciences)
<https://iamg.org/>
2. AGU (American Geophysical Union), <https://www.agu.org>
3. European Geosciences Union (EGU meeting), <https://www.egu.eu/meetings/>
4. AAPG (American Association of Petroleum Geologists Annual Meeting),
<https://www.aapg.org>
5. Society of Exploration Geophysicists (SEG),
[http://www.showsbee.com/company-6057-Society-of-Exploration-Geophysicists-\(SEG\).html](http://www.showsbee.com/company-6057-Society-of-Exploration-Geophysicists-(SEG).html)
6. Society of Economic Geologists (SEG), <https://www.segweb.org/>
7. EarthCube, <https://www.earthcube.org/>
8. International Earth System Science Data Center, OneGeology,
<http://www.onegeology.com>
9. Global Geochemical Database, <https://www.earthchem.org/>
10. Deep-time Digital Earth, <https://www.ddeworld.org/>
11. Engineering Village Platform (EI), (<http://www.engineeringvillage.com/>)
12. Elsevier ScienceDirect, <https://www.sciencedirect.com/>
13. International Association of Sedimentologists (IAS),
<https://www.sedimentologists.org>
14. Goldschmidt conferences, Goldschmidt,
<https://www.geochemsoc.org/events/goldschmidtconference>
15. International Meeting on Organic Geochemistry, IMOG
16. Geofluids, <https://www.hindawi.com/journals/geofluids/>
17. SPE Unconventional Resources Conference (SPE-URC),
<https://onepetro.org/SPEGTS/11UGC/conference/All-11UGC>
18. Web of Science, <https://www.webofscience.com/>
19. GSA Annual Meeting, <https://community.geosociety.org/home>

Chinese Databases

1. China National Knowledge Infrastructure (CNKI), <http://www.cnki.net/>

2. Wanfang Data Resource System, <http://g.wanfangdata.com.cn/index.html>
3. VIP Chinese Journal of Science and Technology, <http://qikan.cqvip.com/>
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5-3 081803 Geological Engineering

No./Name of Work or Journal/Author or Publisher
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28. Gu, Z., et al. Underground Cavern Engineering. Tsinghua University Press.
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30. Sun, J. Theory and Implementation of Underground Engineering. Tongji University Press.
31. Zheng, Y. (1988). Guide to the Design of Anchor Shotcrete Support for Underground Engineering. China Railway Publishing House.
32. Yu, X., et al. Stability Analysis of Underground Engineering Surrounding Rock. China Coal Industry Publishing House.
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84. Canadian Geotechnical Journal (SCI) 0008-3674
85. Chemical Engineering Journal (SCI) 1385-8947
86. Chemistry Letters (SCI) 0366-7022
87. Colloid and Polymer Science (SCI) 0303-402X
88. Computers and Geotechnics (SCI/EI) 0266-352X
89. Earthquake Engineering and Structural Dynamics 1096-9845
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91. Energy & Fuels (SCI) 0887-0624
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95. Engineering Geology (SCI) 0013-7952
96. Geotechnical Engineering, Proceedings of ICE (SCI) 1751-8563
97. Geotechnical Testing Journal (SCI) 0149-6115
98. Geotechnique (SCI) 0016-8505
99. Geotextiles and Geomembrances Journal (SCI) 0266-1144
100. Ground Improvement (SCI) 1755-0769
101. International Journal for Numerical and Analytical Methods in Geomechanics (SCI) 0363-9061
102. International Journal of Coal Geology (SCI) 0166-5162
103. International Journal of Geomechanics (SCI/EI) 1532-3641
104. International Journal of Rock Mechanics and Mining Sciences (SCI) 1365-1609
105. International Journal of Solids and Structures (SCI) 0020-7683
106. Journal of Alloys and Compounds (SCI) 0925-8388
107. Journal of Canadian Petroleum Technology (SCI) 0021-9487
108. Journal of Colloid and Interface Science (SCI) 0021-9797
109. Journal of Earthquake Engineering 1559-808X
110. Journal of Geotechnical and Geoenvironmental Engineering (SCI) 1090-0241
111. Journal of Material Science (SCI) 0022-2461
112. Journal of Mining Science (SCI) 1062-7391
113. Journal of Nanoma Letters (SCI) 1687-4110
114. Journal of Nanoscience and Nano Technology (SCI) 1533-4880
115. Journal of Natural Gas Chemistry (SCI) 1003-9953
116. Journal of Petroleum Science and Engineering (SCI) 0920-4105
117. Journal of Petroleum Technology (SCI) 0149-2136
118. Journal of Physical Chemistry C (SCI) 1932-7447
119. Journal of Wuhan University of Technology-Materials Science Edition (SCI) 1000-2413
120. Landslides (SCI) 1612510X
121. Materials Letters (SCI) 0167-577X
122. Mining Science and Technology (SCI) 16745264
123. Nano Letters (SCI) 1530-6984
124. Oil & Gas Journal (SCI) 0030-1388

125. Oil & Gas Science and Technology (SCI) 1294-4475
126. Oil Gas-European Magazine (SCI) 0342-5622
127. Petroleum Chemistry (SCI) 0965-5441
128. Petroleum Science & Technology (SCI) 1091-6466
129. Petroleum Science (SCI) 1672-5107
130. Proceedings of the Institution of Civil Engineers-Geotechnical Engineering (SCI) 1353-2618
131. Proceedings of the Institution of Civil Engineers-Geotechnical Engineering (SCI) 1353-2618
132. Quarterly Journal of Engineering Geology and Hydrogeology (SCIE) 1470-9236
133. Rock Mechanics and Rock Engineering (SCI) 0723-2632
134. Welding Journal (SCI) 0043-2296
135. Blasting 1001-487X
136. Explosion and Shock Waves 1001-1455
137. Earth Science (SCIE) 1000-2383
138. Underground Engineering and Tunnels 1008-0910
139. Journal of Geomechanics 1006-6616
140. China Trenchless Technology 1003-2932
141. Journal of Engineering Geology 1004-9665
142. Highway 0451-0712
143. Journal of Highway and Transportation Research and Development 1002-0268
144. Journal of Jilin University (Earth Science Edition) 1671-5888
145. Diamond & Abrasives Engineering 1006-852X
146. Heat Treatment of Metals (Chinese Core Journal) 0254-6051
147. Journal of China Coal Society (EI) 0253-9993
148. Coal Geology & Exploration 1001-1986
149. China Petroleum Machinery 1001-4578
150. Petroleum Exploration and Development (EI) 1000-0747
151. Acta Petrolei Sinica (EI) 0253-2697
152. Petroleum Drilling Techniques 1001-0890
153. Hydrogeology Engineering Geology 1000-3665
154. Tunnel Construction 1672-741X
155. Drilling Engineering 1000-3746
156. Journal of Railway Science and Engineering 1672-7029
157. Journal of the China Railway Society 1001-8360
158. China Civil Engineering Journal (EI) 1000-131X
159. Journal of Southwest Petroleum University (Science & Technology Edition) 1674-5086
160. Chinese Journal of Rock Mechanics and Engineering (EI) 1000-6915
161. Chinese Journal of Geotechnical Engineering (EI) 1000-4548
162. Rock and Soil Mechanics (EI) 1000-7598
163. Oilfield Chemistry 1000-4092
164. China Journal of Highway and Transportation 1001-7372
165. Journal of China University of Mining & Technology (EI) 1000-1964

166. Journal of China University of Petroleum (Edition of Natural Science) (EI) 1673-5005
167. China Railway Science 1001-4632
168. The Chinese Journal of Nonferrous Metals (EI) 1004-0609
169. Journal of Central South University (Science and Technology) (EI) 1672-7207
- Drilling Fluid & Completion Fluid 1001-5620
- 170.
171. Professional Websites
172. Foreign Language Database
173. Engineering Village Platform, <http://www.engineeringvillage.com/>
174. Elsevier ScienceDirect, <https://www.sciencedirect.com/>
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176. Chinese Database
177. China National Knowledge Network (CNKI), <http://www.cnki.net/>
178. Wanfang Data Resource System, <http://g.wanfangdata.com.cn/index.html>
179. VIP Chinese Journal of Science and Technology, <http://qikan.cqvip.com/>
180. Superstar Journal, <http://qikan.chaoxing.com/>

5-4 0818z1 Resource industry economics

No./Name of Work or Journal/Author or Publisher
Must-read Monographs
1. Cheng, J., & Tang, S. (2022). Development Report on China's Mineral Resources Industry (2021). China University of Geosciences Press.
2. Tietenberg, T., & Lewis, L. (2021). Environment and Natural Resource Economics (Eleventh Edition). China Renmin University Press.
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4. Deng, H. (2011). Population, Resources and Environment Economics, Science Press.
5. Ma, Z. (2010). Introduction to Environmental and Natural Resource Economics (Second Edition). Higher Education Press.
Journals
Major Chinese Journals:
1. Economic Research Journal
2. The Journal of World Economy
3. China Soft Science
4. China Population, Resources and Environment
5. Resources Science
6. Economic Perspectives
7. China Land Sciences

8. Economic Geography
9. Macroeconomics

Main English Journals:

1. Resources and Energy Economics
2. Renewable and Sustainable Energy Reviews
3. Ecological Economics
4. Energy Economics
5. Environmental and Resource Economics
6. Energy
7. Resources Policy
8. Land Economics

Professional Websites

Foreign Language Databases

1. Elsevier ScienceDirect <https://www.sciencedirect.com/>

Chinese Databases

1. China National Knowledge Network (CNKI), <http://www.cnki.net/>
2. Wanfang Data Resource System, <http://g.wanfangdata.com.cn/index.html>

5-5 0818z3 Geoscience Information Engineering

No./Name of Work or Journal/Author or Publisher
<p>Must-read Monographs:</p> <ol style="list-style-type: none"> 1. Liao, K. (2019). Introduction to Geo-information Science. Beijing: Science Press. 2. Wu, C., et al. (2016). Urban Geological Environment Information System. Beijing: Science Press. 3. Wu, C., et al. (2021). Solid Mineral Exploration Information System. Beijing: Science Press. 4. Kearey, P., et al. (2018). Global Tectonics. Wiley-Blackwell. 5. Lv, Y. (2021). Big Data Visualization Technology. Beijing: The People's Posts and Telecommunications Press. 6. Li, Y., et al. (2020). Data Visualization. Capital Economic and Trade University Press. 7. Zhao, P. (2019). Theories and Methods for Mineral Exploration. Wuhan: China University of Geosciences Press. 8. Zhou, C., et al. (2023). GIS Spatial Analysis Principle. Beijing: Surveying and Mapping Publishing House 9. Gong, J. (2022). Fundamentals of Geographic Information System (Second Edition). Beijing: Science Press.

10. Zhou, Y., et al. (2019). *Big Data Mining & Machine Learning in Earth Science*. Guangzhou: Sun Yat-Sen University Press.
11. Wei Dongqi et al. (2020). *Geological Big Data: Storage and Mining of Unstructured Data*. Beijing: Geology Press.
12. Shi, G. (2012). *Data Mining and Knowledge Discovery for Geosciences*. Beijing: Petroleum Industry Press.
13. Li, A., et al. (2013). *Geological Information System*. Beijing: Science Press.
14. Keller, G. R., & Baru, C. (2011). *Geoinformatics-Cyberinfrastructure for the Solid Earth Sciences*. New York: Cambridge University Press.
15. Kraak, M., & Ormeling, F. (2014). *Cartography Visualization of Spatial Data*. Beijing: Science Press.
16. Hu, H., et al. (2022). *Topological Modeling and Visualization of Space Information Networks*. National Defense Industry Press.
17. Ren, Y., & Jiang, C., & Du, J., & Wang, J. (2018). *Architecture and Applications of Space Information Networks*. Posts & Telecom Press.
18. Min, S., et al. (2020). *Space-Ground Integrated Information Network*. Publishing House of Electronics Industry.
19. Zhang, P., & Yu, C., & Li, W. (2019). *Spatio-Temporal Database Principles and Technologies*. Wuhan University Press.
20. Wu, X. (2018). *Spatio-temporal Big Data and Cloud Platform*. Science Press.
21. Li, C., & Liu, X. (2019). *Theory and Method of Smart City Spatio-Temporal Big Data Platform*. Science Press.

Journals:

1. COMPUTERS AND GEOTECHNICS
2. EARTH SYSTEM SCIENCE DATA
3. IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING
4. AEROSPACE SCIENCE AND TECHNOLOGY
5. INTERNATIONAL JOURNAL OF APPLIED EARTH OBSERVATION AND GEOINFORMATION
6. MATHEMATICAL GEOSCIENCES
7. GEOSCIENTIFIC MODEL DEVELOPMENT
8. HUMAN-COMPUTER INTERACTION
9. SCIENCE CHINA-EARTH SCIENCES
10. IEEE Transactions on Computer
11. IEEE Transactions on Evolutionary Computation
12. IEEE Transactions on Fuzzy Systems
13. IEEE Transactions on Fuzzy Systems
14. IEEE Transactions on Knowledge and Data Engineering
15. IEEE Transactions on Neural Networks
16. IEEE Transactions on Cybernetics
17. Journal of Machine Learning Research
18. Science China Series D, E, F
19. Chinese Science Bulletin

20. Journal of Earth Science-Journal of China University of Geosciences
21. Acta Geologica Sinica
22. Acta Geodaetica et Cartographica Sinica
23. Geological Science and Technology Information
24. Journal of Mineral Deposits
25. Oil & Gas Geology
26. Petroleum Geology & Experiment
27. Acta Petrolei Sinica
28. Geomatics and Information Science of Wuhan University
29. Journal of Software
30. Chinese Journal of Computers
31. Journal of Computer Research and Development
32. Journal of Computer-Aided Design & Computer Graphics
33. A, B, C conferences and journals recommended by China Computer Federation (CCF)

Professional Websites

Foreign Language Databases

1. ASME (American Society of Mechanical Engineers),
<http://asmedigitalcollection.asme.org/>
2. SCIE (Science Citation Index Expanded, Science Citation Index),
<http://www.isiknowledge.com/>
3. Engineering Village Platform (EI), (<http://www.engineeringvillage.com/>)
4. Elsevier ScienceDirect, <https://www.sciencedirect.com/>
5. ACM (Association for Computing Machinery), <https://dl.acm.org/>
6. Springer, <https://link.springer.com/>

Chinese Databases

1. China National Knowledge Network (CNKI), <http://www.cnki.net/>
2. Wanfang Data Resource System, <http://g.wanfangdata.com.cn/index.html>
3. VIP Chinese Journal of Science and Technology, <http://qikan.cqvip.com/>
4. Superstar Journal, <http://qikan.chaoxing.com/>

V. Requirements for Scientific Research Ability and Quality

The School of this discipline aims to improve the students' scientific research competence. The indicators for evaluating students' research ability and level are as follows:

1. Under the guidance of the supervisor, students are expected to obtain relevant data and information through engineering practice, experimental research, and data collection, conduct independent research on specialized topics, sort out and process primary data scientifically by new theories or methods, and exhibit the ability to comprehensively apply scientific theories, methods, and technologies to solving practical problems.

2. During the period of study, students are expected to make at least two public

academic reports with high ability of academic exchange. They are also expected to independently complete academic papers with proficient academic writing skills.

3. The master's degree thesis submitted should exhibit a certain level of innovative understanding in theoretical research or technical methods of this discipline.

VI. Requirements for Thesis and Academic Achievement

(I) Basic Requirements for Master's Degree Thesis

1. A master's student is expected to independently engage in scientific research under the guidance of his/her supervisor, to preliminarily determine the research content and key technologies of the thesis topic, and to develop the technical pathway and workflow for the research. A master's student ought to spend a minimum of two years conducting scientific research and writing the thesis.

2. As conducting scientific research and writing the graduation thesis are crucial in students' study, the students should improve their theoretical and practical skills, as well as scientific and technological writing abilities, so as to independently write academic papers that reflect the achievements. In addition, students are expected to present the technological progress of the discipline, and their academic ideas and technical pathways to peers, and to implement the research project.

3. The thesis for master's degree should provide new insights in certain aspects of the research topic. The thesis requires a clear organization, concise and coherent sentences, clear photos, standardized charts, and the thesis format should follow the regulations formulated by Graduate School. The thesis should be completed at least 30,000 words. The requirement for duplication rate of plagiarism detection in a thesis can be referred to the regulations of CUG.

(II) Academic Achievement Requirements for Applying for a master's Degree

1. A degree applicant must submit the final draft of his/her graduation thesis, defense materials, materials about academic achievement, etc. The duplication rate of plagiarism detection in a graduation thesis must be below the requirement of CUG.

2. A degree applicant should meet the requirement on academic achievements for the master's degree application otherwise formulated by each training degree-conferring entity, if there is any.

Other Notes: