生物质化工学科硕士研究生培养方案

Training Schedule of Master Degree of Biomass Chemical Engineering

专业代码：0822Z2　　学科门类：工　学

Code of Specialty: 0822Z2　　Department of Discipline: Engineering

二级学科：生物质化工　　学分要求：40～42

Second-grade Discipline: Biomass Chemical Engineering　　Credit Setting: 40～42

一、学科、专业简介 (Disciplines Instruction)

生物质化工是一门随着生物质科学在各领域的广泛应用而诞生的交叉学科，是以生物质资源材料为原料进行开发利用为基础的应用性极强的学科，也是化工科学中发展最为迅速的学科。它涉及了微生物学、生物工程、轻工技术与工程、化学工程的内容。现代的生物质产业是指利用可再生或循环的有机物质，通过工业性加工转化，提供生物基产品和生物能源的环境友好产业。

Biomass Chemical Engineering is a interdiscipline borned with the wide application of biomass in various fields, a discipline with high applicability on the basis of exploiting and using biomass resources, as well as a discipline with fastest-growing rate among that of chemical engineering. This discipline involves the details of microbiology, biotechnology, light chemical engineering and chemical engineering. The modern biomass chemical engineering means provide a eco-friendly industry with biomass products and bio-energy gained by the industrial transformation of renewable or organic substance.

本学科是以我校轻工技术与工程硕士学位一级学科点的优势为基础，面向生物质化工利用及其清洁化生产技术所建成的一个具有较强工程技术综合优势的二级学科。本学科师资力量雄厚，职称、年龄结构合理；教学科研条件良好，设备仪器齐全。配有荧光显微镜、凝胶扫描仪、冷冻离心机、自动发酵罐、高速离心机、超低温冰箱、高效液相色谱仪、气相色谱仪、核磁共振波谱仪、电子显微镜、超薄切片机、恒温振荡培养箱、ICP 发射光谱仪、FT-IR 红外光谱析仪、原子吸收光谱仪、PCR 仪、数码显微系统、高压多用途电泳仪等先进仪器设备。

This discipline is a second-level subject established on the basis of our first-level discipline master's degree programs—light industry technology and engineering, with high engineering technology comprehensive advantages facing the use of biomass chemicals and corresponding cleaner production technology. At present, this discipline possesses solid qualified teachers with rational technical titles and age structure, and is provided with good conditions for both teaching and research. Many modern instruments and equipments, such as fluorescence microscope, gel scanner, refrigerated centrifuger, fermentation cylinder, supercentrifuge, ultra-low temperature freezer, high performance liquid chromatograph(HPLC), gas chromatography(GC), nuclear magnetic resonance spectrometer, electron microscope, ultra microtome, constant temperature oscillation incubator, ICP emission spectrometer, FT-IR, atomic absorption spectrometer, PCR, digital microscopy system and multipurpose electrophoresis apparatus are equipped in the laboratories.

二、培养目标（Objectives of Training）

主要培养德、智、体全面发展的应用型、复合型人才。硕士学位获得者掌握生物质领域的基本知识和技能，熟悉生物质能源开发和利用、生物质材料技术在农业和工业中的应用。具有较强的实践动手、解决实际问题的能力，并具有一定的创新能力，熟练掌握一门外语，能够承担高等院校、科研院所、企业中相关专业技术或管理工作，成为具有良好职业素养的高层次应用型和复合型专门人才。

This discipline aims to turn out practical and inter-disciplinary talents with all-around development in moral, intellectual and physical education, who should grasp the basic knowledge and skills, be familiar with the development and utilization of biomass energy as well as the application of biomass materials technology in agriculture and industry .The master's degree recipients are trained to acquire strong capacity of innovation, practice and solving problems, master a foreign language, be able to be engaged in relevant professional techniques or management work in universities ,scientific research institute and companies, become high level trained personnel with professional accomplishments.

三、学制及学习年限（Educational System and Length of Schooling）

硕士研究生学制为 2～3 年，可根据实际情况允许研究生提前或延期毕业，一般不超过 4 年。课程学习为 1～2 学期，论文工作不少于 1 年。硕士生课程学习实行学分制，至少应修 40 学分, 其中学位课程≥18 学分，研究环节 13 学分。

The basic length of schooling for master's postgraduate education shall be two to three years, the postgraduates are allowed to graduate according the actual requirements，but always less than four years. The length of curriculum is usually one to four terms, and the time of writing a paper is at least one year. The studying of master's post graduate courses carry out the credit system, the students should obtain forty to forty-two credits during the studying. The degree courses are at least eighteen credits, the research links are thirteen credits.

四、研究方向（Research Orientation）

序号 NO.	名　称 Name	研究方向及特点 The Research Orientation and characteristic
1	生物质基新材料 Biomass Advanced Materials	研究将生物质材料（纤维素、半纤维素、木质素、淀粉、甲壳素、瓜尔胶、蛋白质等）转化为能源或高附加值功能材料的原理和应用技术。 Focus on the research of basic theory and practical technology on the conversion biomass (cellulose, hemicellulose, lignin, starch, chitin, guar gum, protein, etc.) into energy resource or high value-added functional materials.
2	生物质精细化学品 Biomass fine chemicals	研究生物质原料的物理、化学及生物改性手段及其功能性衍生物的开发。 Focus on the physical, chemical, and biological modification of biomass resources natural products and development of their functional derivatives.

3	生物质能源 Biomass Energy	研究以农林有机废弃物和能源植物等为原料生产新兴能源，缓解能源危机。 Focus on the production of renewable energy with agroforestry organic wastes and energy plants, etc.

五、课程设置（Course Setting）

生物质化工硕士研究生课程设置

（Course Setting of Master Degree for Biomass Resource Industry）

课程类别 Course Type	课程编号 Course NO		课程名称 Course Name	课堂学时 Class Hour	学分 Credit	开课学期 Semester Classes	教学方式 Teaching Method	考核方式 Assessing Method	开课单位 Class Department	备注 Remarks
学位课 Degree Courses	公共基础课 Common Course	G000042	中国特色社会主义理论与实践研究 Socialist Theory with Chinese Characteristics and Practical Research	36	2	I	A	C	马克思主义学院	必修 Obligatory Course
		G000039	科学人文讲座 Scientific and Humanistic Lectures	16	1	II	A	C		
		G000037	基础英语（I, 含 16 学时视听） Basic English(Contains 16 classes of audio-visual)	64	2	I	A	A	外国语学院	必修 Obligatory Course
		G000038	基础英语（II） Basic English（II）	32	2	II	A	A		
			科技英语 Scientific English	32	2	II	A	A		
		G000046	英语高级（硕）（限免修生） Advanced English Course (only the students who are exempted from this course allowed)	64	2	I	A	A		
			小语种（小语种考生） Minority Languages (minority languages students)	96	4	I、II	A	A		
		G000019	数值分析 Numerical Analysis	32	2	I	A	A	数理学院	必修 Obligatory Course
		G000020	应用统计 Application of Statistics	32	2	I	A	A		
		M012098	现代仪器分析 Modern Instrumental Analysis	32	2	I	A	A	化工学院	必修 Obligatory

	专业基础课 Specialized Course	M012046	高等有机化学 Advanced Organic Chemistry	32	2	Ⅰ	A	A		Course
		M012047	天然高分子结构分析及应用 Structure Analysis and Application of Natural	32	2	I	A	A		
		M012055	纸基功能材料 Paper-based Functional Materials	32	2	I	0.5A+0.5B	C		
		M012054	轻化工助剂化学与应用 Chemistry and Application of Additives in Light	32	2	I	0.6A+0.4B	B		
		M012009	高等化学反应工程 Advanced Chemical Reaction Engineering	40	2.5	I	A	A+C		
		M012010	高等分离工程 Advanced Separation Engineering (II)	32	2	I	A	A+C		
		M012012	现代化学工艺学 Modern Chemical Technology	40	2.5	I	A	A		
选修课 Selective Course	G000006		自然辩证法概论 Introduction to Natural Dialectics	18	1	I	A	A	马克思主义学院	必选 Obligatory Course
	G000017		科技论文撰写 Writing of Technological Thesis	16	1	II	A	A	化学院	必选 Obligatory Course
	M012050		精细高分子合成与应用 The Synthesis and Application of Fine Polymers	32	2	I	A	A	化工学院	选修 Selective Course
	M012051		浆纸分析与检验 Test and Analysis and Detection of Pulp and Paper	32	2	I	0.4A+0.6D	D		
	M012052		制浆化学 Pulping Chemistry	32	2	I	0.7A+0.3D	C		
	M012053		造纸化学 Papermaking Chemsitry	32	2	I	0.7A+0.3B	C		
	M012093		高等生物催化工程 Advanced Biocatalysis Engineering	32	2	I	0.5A+0.5B	C		
	M012094		胶体与固体表面化学 Colloid and Solid Surface Chemistry	32	2	I	A	B		
	M012092		高等生化分离工程 Advanced Biochemical Separation Engineering	32	2	I	0.5A+0.5C	C		
	M012019		现代化工实验方法 Experimental Methods of Modern Chemical	32	2	I	A+B	A+C		
	M012021		工业有机合成工艺学 Industrial Organic Synthesis Technology	32	2	I	A+B	A+C		

	M012020	绿色精细化工工艺 Green Fine Chemical Technology	32	2	I	A	A		
	M012027	专业英语写作 Professional English Writing	16	1	I	A	A+B		
	M012024	催化反应工程 Catalytic Reaction Engineering	32	2	I	0.7A+0.3B	0.5B+0.5D		
	M012016	过程最优化方法 Process optimization method	32	2	I	A	A+C		
	M012017	化工过程设计与开发 Chemical Process Design and Development	24	1.5	I	A	A+C		
	M0012104	工业助剂 Industrial Additives	32	2	I	A	B+C		
研究环节	M012001	开题报告 Thesis Proposal		1					
	M012002	学术讲座 Academic Lectures		1					
	M012003	实践活动 Practical Activity		1					
	M012004	中期考核 Medium-term Assessment		1					
	M012005	发表论文 Published Thesis		1					
	M012006	学位论文 Degree Thesis		8					
补修课程 Make-up Course	M012060	天然高分子化学 Chemistry of Natural Polymers	64			A	A	化工学院	可根据导师要求补修，不计入学分 Patching in order to supervisor's requirement, Not included in the credit
	M012061	轻化工工艺 Technology of Light Chemical Engineering	64			A	A		
	M012062	轻化工设备 Equipment of Light Chemical Engineering	64			A	A		
	M012063	精细化学品化学 Chemistry of Fine Chemicals	48			A	A		
	M012111	化工原理 Chemical Engineering Principles	32			A	A		
	M012112	分离工程 Separation Engineering	32			A	A		

注 1. 教学方式代码：A—课堂讲授，B—学术研讨，C—专题报告，D—实践，E—其他；例：0.7A+0.3B

Notes1. Teaching method codes: A—lecturing in dass B—Academic discussion, C—subjective report, D—practice,E—others;

注 2．考核方式代码：A—闭卷笔试，B—开卷笔试，C—课程论文，D—平时作业，E—口试，F—其他；例：0.8A+0.2D **Notes2 Examining method codes: A—written exam with closed paper, B—written exam with opened paper, C—Class paper, D—ordinarily assignment, E—oral test ,F—others； e.g.: 0.8A+0.2D**

六、课程教学（Course Teaching）

研究生课程实行学分制，分为学位课和非学位课两部分，每个专业应积极创造条件逐步做到至少有一门专业课用外语讲授。每位研究生在学期间应修完个人培养计划中所要求的学分，方能进入中期考核。

The courses are divided into two parts, degree courses and non-degree courses, with an assessment system of credit. Each specialty should actively create conditions to gradually achieve that at least one specialized course should be given in English. Each postgraduate should complete the required credits in the cultivation plan to enter the mid-term assessment.

研究生课程的教学方法应建立以研究生为主体的教学方式，充分发挥研究生的主动性和自觉性，更多地采用启发式、研讨式及参与式的教学方法。课程考核分考试与考查，除特殊情况外，学位公共课一般采用闭卷考试。学位基础课、学位专业课采取闭、开卷考试与考查相结合的方式。

Student-oriented teaching method should be established, making full use of students' initiative and self-consciousness, adopting heuristic, seminar-style and participatory means more. Examination and test are used to evaluate students. Except politics for Doctor's Degree, public degree courses generally use a closed-book exam. Basic degree courses and professional degree courses use a combination of closed-book, open-book exam and test.

七、论文的要求（Dissertation Requirements）

学位论文是硕士研究生培养的重要要组成部分。论文涉及内容应选对我国经济和社会发展有切实相关意义的课题或是学科前沿课题；学位论文要突出创新性、前沿性和科学性。课题研究与论文撰写是对研究生进行科学研究或承担专门技术工作的全面训练，是研究生综合运用所学知识，发现问题、分析问题和解决问题能力的过程，是对研究生综合能力的评判。

This is a major component in the process of cultivating postgraduate students. Research paper should focus on issues that have great significance for China's economic and social development, or is the frontier, important subject. The dissertation should be innovative and scientific. This is a comprehensive training of what the students are researching or undertaking specialized tasks, a process of finding, analyzing and solving problems, and a judgment of a student's comprehensive abilities.

学生应在导师的指导下，在第 2～3 学期在一级学科范围内确定论文题目、制定研究计划，并经研究室审核后报研究生部，并接受研究生部和学院的定期检查。学位论文必须独立完成，要做到资料可靠，理论正确、思路清晰、有创新点。按照《中华人民共和国学位条例》和《青岛科技大学硕士学位授予工作细则》的规定，经答辩合格者授予硕士学位。

Students should choose topics, make plans, and submit to the postgraduate department under the guidance of supervisors in the second or third term. The dissertation should be finished independently, with reliable resources, correct theories, clear thoughts and creative ideas. Those who pass the graduation oral examination through the discussion of College Degree Assessment Points Committee, after being reported to and approved by School Academic Degree Evaluation Committee, will be awarded a Master's degree.