Instructive Cultivation Plan for the Program of Mechanical Engineering

(Pathway from Secondary Vocational to Undergraduate Education---Undergraduate Level)

(Grade 2020)

Course code: 080201

1. Orientation

Shanghai Polytechnic University and Shanghai Industrial Technology School have jointly build a pathway platform of Mechanical Engineering (numerical control technology) by following the national and Shanghai medium and long-term educational reform and development planning outline to promote the connection between secondary vocational education and higher education and to build a bridge between the courses, training models and schooling systems in both secondary vocational education and higher education. In this way, the program trains innovative talents with abundant knowledge and strong skills to meet the needs of economic and social development.

The pathway from second vocational to undergraduate education of Mechanical engineering (numerical control technology) is 7-year program. It means a 3+4 combination of secondary vocational education and application-oriented undergraduate education. The 7-year integrated talent training model strengthens university-enterprise cooperation, work-study integration, modularization, and project-led teaching. Integration is realized in the curriculum and practical trainings which effectively integrates resources and begins professionalism cultivation and skills training in advance in the talent training process. The secondary vocational stage offers application courses for operational skills, emphasizing the training of operational ability and practical ability while the undergraduate stage offers theory courses to guide students in theoretical and empirical research. Vocational education is introduced much earlier in the pathway of secondary vocational and undergraduate education, and a ladder is built for professional competence and education level, which better satisfies the actual needs of applied talents who meet professional requirements in production and service.

2. Cultivation Objectives

2.1. General objectives

This program intends to cultivate knowledge-based, high-skilled on-site engineering and technical

talents who have solid basic knowledge of mathematics and natural sciences, basic engineering knowledge, good humanities and professional ethics, master the specialized basic knowledge and application capabilities of mechanical design, mechanical manufacturing and automation, can be engaged in design, manufacturing, technology development, operation management and application support etc. on the front line of industrial production field, and have comprehensive quality of moral, intellectual, physical, aesthetic and work.

The pathway from secondary vocational to undergraduate education model focuses more on cultivating knowledge-based and high-skilled application-oriented innovative talents, such as CNC programming and parts CNC machining, CNC machine tool fault diagnosis and maintenance, CNC machining production organization and management, quality control and production optimization etc. that can be engaged in works related to the application of CNC technology.

2.2. Value

In order to realize the transformation from a "manufacturing country" to a "manufacturing power", the program of Mechanical Engineering will expand on the ideological and political education of "manufacturing power" and "craftsman spirit", and based on school-enterprise cooperation, implement the cultivation of social responsibility, teamwork ability, lifelong learning ability and innovative spirit throughout the whole process of talent training and training program design.

2.3. Objectives students must achieve five years after graduation:

1) Be able to use mechanical engineering expertise, technology and skills to analyze and solve mechanical engineering problems related to professional positions, be able to independently solve more complex mechanical engineering technical problems, and can adapt to an independent and team working environment;

2) Have good scientific research literacy and teamwork spirit, and be able to undertake, organize or participate in engineering issues related to mechanical engineering from the perspective of social responsibility, legal and ethical training, safety and environmental awareness, and sustainable development.

3) Be familiar with the current situation and development trend of mechanical engineering at home and abroad, familiar with industry regulations and standards by learning advanced manufacturing technology at home and abroad through self-learning, and constantly improve their own quality and ability, and adapt to professional and social development.

3. Requirement for Graduation

According to the twelve graduation requirements of the General Standards issued by the China

Engineering Education Certification Association, the program of mechanical engineering expands the core competence and quality expression of twelve graduation requirements based on the talent training positioning of our school. The indicators are broken down as follows:

3.1. Engineering knowledge: Be able to use mathematics, natural sciences, engineering foundations and professional knowledge to solve complex engineering problems in mechanical engineering, especially mechanical design, precision machining and manufacturing;

1-1: Be able to use the mathematics, natural science, engineering foundation and professional knowledge necessary for mechanical engineering to express complex mechanical engineering problems;

1-2: Be able to establish a mathematical model and solve for a complex mechanical system or mechanical manufacturing process;

1-3: Be able to use relevant knowledge and mathematical models to deduct, analyze, and discriminate solutions to complex mechanical engineering problems;

1-4: Be able to apply mathematical models and related engineering knowledge to analyze and compare solutions to complex mechanical engineering problems, and try to improve them.

3.2. Problem analysis: Be able to apply the basic principles of mathematics, natural sciences and engineering sciences to identify, express, and analyze complex mechanical engineering, especially mechanical design, precision machining and manufacturing problems through literature research, so as to obtain effective conclusions.

2-1: Be able to use the basic knowledge and basic principles of mathematics, natural science and engineering science to identify and judge key technologies and key parameters of complex mechanical engineering problems;

2-2: Be able to correctly express, deduct, analyze and synthesize complex mechanical engineering problems based on relevant scientific principles and mathematical model methods;

2-3: Be able to recognize that there are multiple solutions to complex mechanical engineering problems, and seek alternative and backup solutions through literature research;

2-4: Be able to use the basic principles of mechanical engineering and special application fields, and use literature research to analyze the influencing factors of the process, thus obtaining effective conclusions.

3.3. Design/development solutions: Be able to design solutions for complex mechanical engineering, especially mechanical design, precision machining and manufacturing problems; be

able to design mechanical systems, mechanical components or precision machining processes that meet specific needs, and reflect innovation in the design link; and be able to considering social, health, safety, legal, cultural and environmental factors.

3-1: Master the basic design/development methods and technologies of the whole life cycle and whole process of mechanical engineering design and mechanical product development, be able to describe design goals, and analyze various factors that affect design goals and technical solutions;

3-2: Be able to formulate solutions for specific needs and complete the design of systems, components and parts;

3-3: Be able to design mechanical systems or technological processes, and reflect the sense of innovation in the design;

3-4: Be able to present design results in the form of reports, drawings or objects;

3-5: Be able to comprehensively consider social, health, safety, legal, ethical, cultural and environmental factors in the design.

3.4. Research: Be able to study complex mechanical engineering, especially mechanical design, precision machining and manufacturing based on scientific principles and scientific methods, including designing experiments, analyzing and interpreting data, and obtaining reasonable and effective conclusions through information synthesis.

4-1: Based on scientific principles and combined with literature research or related methods, be able to conduct research and analysis for complex mechanical engineering problems, and design feasible solutions;

4-2: According to the characteristics of the mechanical engineering system or problem, be able to select the research route and design the experimental plan;

4-3: Be able to construct an experimental system according to the experimental plan, carry out experiments safely, and collect experimental data correctly;

4-4: Be able to analyze and interpret experimental results, and obtain reasonable and effective conclusions through information synthesis.

3.5. Use modern tools: Be able to develop, select and use appropriate technology, resources, modern engineering tools and information technology tools for complex mechanical engineering, especially mechanical design, precision machining and manufacturing problems, including the prediction and simulation of complex mechanical engineering problems, and understand its limitations.

5-1: Understand the principles and methods of using modern instruments, information technology tools, engineering tools and simulation software commonly used in the profession, and understand their limitations;

5-2: Be able to select and use appropriate instruments, information resources, engineering tools and professional simulation software to analyze, calculate and design complex mechanical engineering problems;

5-3: Be able to develop or select modern tools that meet specific needs for specific objects of complex engineering problems in the field of mechanical engineering, be able to simulate and predict professional problems, and be able to analyze their limitations.

3.6. Engineering and society: Be able to conduct reasonable analysis based on engineering-related background knowledge, evaluate the impact of mechanical engineering professional engineering practices and complex engineering problem solutions on society, health, safety, law, and culture, and understand the responsibilities that should be undertaken.

6-1: Understand the technical standard system, intellectual property rights, industrial policies, laws and regulations in mechanical engineering related fields, and understand the potential impact of different social cultures on mechanical engineering activities.

6-2: Be able to analyze and evaluate the impact of mechanical engineering practices on society, health, safety, law, and culture, as well as the impact of these constraints on project implementation, and understand the responsibilities that should be undertaken.

3.7. Environment and sustainable development: Be able to understand and evaluate the impact of engineering practice for complex engineering problems on the environment and sustainable development of society.

7-1: Understand the connotation and significance of environmental protection and sustainable social development, and be able to practice the concepts of environmental protection and sustainable development when solving complex mechanical engineering problems;

7-2: Be able to evaluate the potential hazards to humans and the environment for actual mechanical engineering projects, and understand the social, safety and legal responsibilities that they should bear.

3.8. Professional norms: Have humanities and social science literacy, possess a sense of social responsibility, be able to understand and abide by engineering professional ethics and norms in mechanical engineering practice, and be able to perform responsibilities.

8-1: Have correct values, understand the relationship between individuals and society, and

understand the national conditions of China;

8-2: Understand the engineering professional ethics and norms of honesty, fairness and integrity, and be able to consciously abide by it in the practice of mechanical engineering;

8-3: Understand the social responsibility of mechanical engineers for the safety, health and well-being of the public, as well as environmental protection, and be able to consciously fulfill their responsibilities in the practice of mechanical engineering.

3.9. Individuals and teams: Be able to assume the roles of individuals, team members and leaders in a team with a multidisciplinary background.

9-1: Possess basic interpersonal and communication skills, be able to communicate effectively with members of other disciplines, and work independently or cooperatively;

9-2: Be able to organize, coordinate and direct team work in a multidisciplinary team.

3.10. Communication: Be able to effectively communicate with industry peers and the public on complex mechanical engineering, especially mechanical design, precision machining and manufacturing issues, including writing reports and design manuscripts, making statements, expressing clearly or responding to instructions, and having certain international perspective, and be able to communicate and exchange in a cross-cultural context.

10-1: Be able to accurately express one's own views, respond to queries, and understand the differences in communication with industry peers and the public in terms of oral, manuscripts, charts or drawings on professional issues in mechanical engineering;

10-2: Understand the international development trends and research hotspots in the field of mechanical engineering, understand and respect the differences and diversity of different cultures in the world;

10-3: Possess the language and written expression skills for cross-cultural communication, and be able to conduct basic communication and exchanges on mechanical engineering issues in a cross-cultural context.

3.11. Project management: Understand and master the principles of mechanical engineering management and economic decision-making methods, and can be applied in a multi-disciplinary environment.

11-1: Understand and master the important engineering management principles and economic decision-making methods involved in mechanical engineering activities;

11-2: Understand the cost composition of the entire life cycle and process of mechanical engineering and mechanical products, and understand the engineering management and economic decision-making issues involved;

11-3: Be able to use engineering management and economic decision-making methods in the process of designing and developing mechanical engineering project solutions in a multidisciplinary environment (including simulation environment).

3.12. Have the consciousness and ability of lifelong learning: Possess the consciousness of independent learning and lifelong learning, and have the ability to continuously learn and adapt to development.

12-1: Be able to correctly understand the necessity of self-exploration and lifelong learning, and have the consciousness of independent learning and lifelong learning;

12-2: Be able to take appropriate methods for independent learning according to personal or professional development needs, and have the ability to adapt to the technological development and knowledge update in the field of social and mechanical engineering.

4. Schooling system

Four years

5. Length of study

Flexible study period, generally four years, the minimum length of flexibility is not less than three years, the longest not more than six years.

6. Requirements for graduation and degree conferring

Students of this program must complete the minimum credits required for each category of courses and complete all the content specified in extracurricular class according to the requirements of the instructional training plan, and the total credits must reach 155 credits for graduation; those who meet the requirements for bachelor's degree can be conferred bachelor degree in engineering.

7. Discipline

Mechanics and Mechanical Engineering

8. Core Courses

8.1. Introduction to Engineering (16 course hours)

The purpose of this course is to allow students to understand the engineering problems involved in related engineering programs (especially mechanical engineering program), stimulate their interest in learning engineering programs (especially mechanical engineering program) and clarify their motivations by introducing the basic features and concepts of engineering, solutions to general engineering problems, and the tasks and responsibilities faced by engineers. Through the study of this course, students can put forward some ideas and thoughts for solving engineering problems when facing general engineering problems. The focus of this course is to cultivate students' engineering awareness and lay the necessary foundation for students to study subsequent professional courses.

8.2. Modern engineering drawing (64 course hours)

This course is a core program basic course for mechanical programs. Its task is to cultivate students' ability to draw engineering graphics, read engineering graphics, and initially conceive spatial shapes. Through the study of this course, students will be able to master the basic theory of projection method, master the projection laws of spatial points, lines, surfaces and bodies, master the projection diagram expression methods of mechanical parts, be able to use common drawing tools and instruments to draw engineering draws correctly and skillfully, master the computer drawing ability of engineering drawings, master the general methods and specific steps of reading engineering drawings, and comprehensively improve the comprehensive quality of mechanical disciplines. Engineering drawings are hailed as the "language of the engineering field" and are important tools for scientific and technological workers to express and exchange technical ideas.

8.3. Engineering Mechanics (96 course hours)

This course is a theoretical technical foundation course, including "Engineering Mechanics I" and "Engineering Mechanics II". Through the study of "Engineering Mechanics I", students will be able to select the isolator from the mechanism or structure and draw the free-body diagram accurately; be able to analyze the static force of the component and determine the binding force correctly; understand and solve the friction of the plane force system; correctly calculate the velocity and acceleration of a point, the angular velocity and angular acceleration of a rigid body; understand the relativity of motion, master the method of point motion and synthesis; correctly calculate the velocity and acceleration of each point on a rigid body in plane motion; use dynamics general theorems (theorem of momentum, theorem of moment of momentum, theorem of kinetic energy, theorem of mass center motion, differential equation of fixed axis rotation) to solve dynamic problems; use D'Alembert principle to solve dynamic reaction problems; understand the principle of virtual displacement. Through the study of "Engineering Mechanics II", students will obtain the preliminary ability to simplify general rod-like components into mechanical diagrams; be able to make the internal force diagrams of rods under basic deformation proficiently, calculate their stress and displacement, and carry out strength and stiffness calculations; understand the

concept of stress state and strength theory, and apply it to the strength calculation of rods under combined deformation; understand the method of solving simple statically indeterminate problems; understand the concept of stability of compression rods, and be able to calculate the critical load and critical stress of axial compression rod, and check for stability; understand the concepts of dynamic load coefficient in dynamic load and fatigue failure and endurance limit in alternating stress; have a preliminary understanding of the basic mechanical properties and test methods of commonly used materials; have a preliminary understanding of the basic principles and methods of stress analysis in electrical measurement experiments. Engineering and technical personnel who are proficient in the knowledge structure of basic mechanics courses such as engineering mechanics will surely be able to play an important role in promoting our country from a manufacturing country to a manufacturing power.

8.4. Mechanical principle and innovative design of mechanism (64 course hours)

This course is a theoretical and practical integrated course specially set up by Pathway from secondary vocational to undergraduate education training mode. The main content includes mechanism kinematics analysis and innovative design practice. This course mainly teaches the composition principle of the mechanism, basic knowledge of various commonly used mechanisms (such as link mechanisms, cam mechanisms, gear mechanisms, gear trains, intermittent motion mechanisms and other commonly used mechanisms, etc.) and their design methods. Through the study of this course, students will understand the basic theories of mechanism structure, mechanical kinematics and dynamics, master the performance, working principles and design methods of various mechanisms, and obtain the ability to design mechanical system schemes. In the process of plan conception and structure design, combining with the development history of mechanical engineering and the research and development of the pillars of a great power, inspire and cultivate students' ability of analysis, comparison, judgment and decision-making, as well as the sense of responsibility, quality and engineering.

8.5. Mechanical design (48 course hours)

This course is a basic technical course that trains students to have the ability of mechanical design. Introduce the course from several aspects such as mechanical design criteria, mechanical development history, and research and development of the pillars of a great power. Through this course, students will understand the general knowledge of mechanical design, and understand the main types, performance, structural characteristics, applications, materials, and standards of mechanical components; grasp the basic principles of mechanical design, working principles of mechanical parts, stress analysis, stress state, failure mode, working capacity calculation criteria, etc.; be able to design and calculate simple machines; be trained in design calculations, structural design and drawing, experiments, and technical documentation skills. Through conceiving creativity and innovative design, the course can integrate industry standards, safety awareness,

responsibility awareness and other concepts into mechanical design.

8.6. Electrician and Electronics (48 course hours)

This course will enable students to master the basics of electrical engineering and electronics necessary for the program. Through the study of this course, students will grasp the basic concepts and basic laws of circuits, be familiar with the basic analysis methods of DC and AC circuits; be familiar with the transition process of circuits, and obtain the ability to read and analyze relay contact control circuits; be familiar with the knowledge of factory power transmission and distribution and safe power use; master the application characteristics of common semiconductor components and the application of amplifying circuits and integrated operational amplifiers, be familiar with negative feedback circuits, and be familiar with gate circuits and combinational logic circuits, and trigger sequential logic circuits; be familiar with the basic experimental methods of electrical and electronic application technology. The study of this course is a necessary condition for students to become builders in the field of mechanical and electrical integration in the process of socialist modernization and to inherit the spirit of craftsmanship.

8.7. Technology of Mechanical Manufacture (64 course hours)

This course integrates the teaching content of the mechanical manufacturing process courses, mainly teaches the basic knowledge and related manufacturing technology in the mechanical manufacturing process, mainly including the selection of common metal materials and main heat treatment methods; basic knowledge of metal blank casting, forging, and welding forming methods; basic knowledge of cutting principles; various cutting methods of common parts surface and basic knowledge of machine tools, tools, technology and other aspects required for the cutting process; design principles and methods of fixtures. Through the study of this course, students will master the ability to compile processing procedures and related technologies for medium-complex mechanical parts. In the course of the study of this course, students will be cultivated for the working spirit of craftsmen from a great country of seeking truth from facts, closely integrating theory with practice, and studying hard.

8.8. CNC machine tools and programming (48 course hours)

This course is one of the program compulsory courses. Based on the basic knowledge of metal cutting machine tools, this course teaches the basic concepts of CNC machine tools, the mechanical structure of CNC machine tools; the functions and interpolation principles of CNC systems; the form and composition of servo drive systems; the application knowledge of the selection and maintenance of CNC machine tools; the characteristics and analysis methods of CNC machining technology, and based on the FANUC system (or other systems), introduces the commonly used programming instructions of CNC lathes, milling machines, and machining

centers, as well as the methods and steps of manufacturing program programming. The training objective of this course is to enable students to understand the structure and working principle of typical CNC machine tools, be familiar with and master the basic programming methods of CNC machine tools, and be able to independently complete typical parts processing. With the development of China's manufacturing and intelligent manufacturing industry, the "pillars of great power" demonstrates that China's manufacturing is moving towards mid-to-high end, and CNC technology is one of its supports. Learning this course well and under the guidance of the spirit of craftsmen and model workers, graduates will lay a solid foundation for making a powerful country.

9. Practical training (Related courses)

The practice of this program includes two parts: in-class experiment and independent practice. Some of these courses adopt a teaching method that integrates theory and practice, and redesign and develop the teaching contents for the pathway from secondary vocational to undergraduate education training program, which contains more practical links.

The independent practice links mainly include: Interchangeability and measurement technology practice, computer-aided design and manufacturing practice, mechanism process specification design practice, CNC equipment failure analysis and practice, CNC machining comprehensive practice, multi-axis machining and simulation practice, mechanical engineering comprehensive practice, mechanical system design and precision manufacturing project integration, graduation internship and graduation design (thesis) of mechanical engineering, etc.

10. Course structure and course hours (excluding extracurricular class)

Category	Total Credit	%	Total Course Hours	Theory Learning	Practical Training
General Education	55.5	35	1056	988	68
Basic professional courses	33	22	528	457	71
Professional courses	19	12	304	238	66
Practical Training	35.5	23	1024	0	1024
General course	11	8	176	154	22
Total	154	100	3088	1837	1251
Theory : Practice(%)	60:40				

11. Teaching schedule (1)

Category	Type	Provided by	Course Code	Course Name	Assessment	Credit	Course Hour	Theory Learning	Practical Training	Semester
General Education	Required	School of Marxism	b1080001	Basic principles of Marxism	test	3	48	42	6	Spring 1
	Required	School of Marxism	b1080003	Morality and Laws	non-test	3	48	42	6	Spring 1
	Required	School of Marxism	b1080006	Outline of Chinese Modern History	non-test	3	48	42	6	Autumn 1
	Required	School of Marxism	b1080004	Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics I	test	3	48	42	6	Autumn 2
	Required	School of Marxism	b1080007	Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics II	test	2	32	28	4	Spring 2
	Required	School of Marxism	-----	Situation and Policy (Modules 1～4)	non-test	2	32	28	4	Autumn 1～spring 2
	Required	School of Marxism	B1080008	Labor Education A	non-test	0.5	16	16		Autumn 2
	Required	College of Arts and Sciences	b1020080-	Advanced Mathematics A1	test	4	64	64		Autumn 1
	Required	College of Arts and Sciences	b1020081-	Advanced Mathematics A2	test	4	64	64		Spring 1
	Required	College of Arts and Sciences	b1020012-	Linear algebra	test	2	32	32		Autumn 2
	Required	College of Arts and Sciences	b1020013-	Probability Theory and Mathematical Statistics	test	2	32	32		Autumn 2
	Required	College of Arts and Sciences	b1020076	Calculation method	test	2	32	32		Autumn 2
	Required	College of Arts and Sciences	b1020023-	Complex function and integral transformation	non-test	2	32	32		Spring 2

Category	Type	Provided by	Course Code	Course Name	Assessment	Credit	Course Hour	Theory Learning	Practical Training	Semester
	Required	College of Arts and Sciences	b1020062-	College Physics A (module 1)	test	3	48	48		Spring 1
	Required	College of Arts and Sciences	b1020065-	College Physics B	test	2	32	32		Autumn 2
	Required	College of Arts and Sciences	b1020066-	College Physics C	non-test	1	32		32	Autumn 1
	Required	College of Engineering	b1020035-	College Chemistry	test	1	32	28	4	Autumn 1
	Required	College of Arts and Sciences	b1020018	College Chinese	non-test	2	32	32		Spring 1
	Required	Others	b1110003	Military Skills	non-test	0.5	2W			Autumn 1
	Required	College of Arts and Sciences	b1110002	Military Theory	non-test	0.5	32	32		Autumn 2
	Required	Physical Education	-----	Physical Education I～VI	non-test	3	160	160		Autumn 1～autumn 4
	Required	College of Arts and Sciences	b1020003-	General English III	test	3	48	48		Autumn 1
	Required	College of Arts and Sciences	b1020004-	General English IV	test	3	48	48		Spring 1
	Required	College of Arts and Sciences	b1020005-	General Academic English A	test	2	32	32		Autumn 2
	Required	College of Arts and Sciences	---	English development	non-test	2	32	32		Spring 2
Sub-total (General Education)						**55.5**	**1056**	**988**	**68**	
General	Required	College of Engineering	b2011322	Basic Programming C++	test	3	48	32	16	Spring 2

Category	Type	Provided by	Course Code	Course Name	Assessment	Credit	Course Hour	Theory Learning	Practical Training	Semester
Course	Required	College of Engineering	b2011143	Project management	non-test	2	32	26	6	Spring 3
	Selective	Others	b0-----	Social Science and Humanities Literacy (4 credits) Public Art (2 credits)	non-test	6	96	96		Spring, autumn
Sub-total (General Course)						11	176	154	22	

11. Teaching schedule (2)

Category	Type	Provided by	Course Code	Course Name	Assessment	Credit	Course Hour	Theory Learning	Practical Training	Semester
Basic courses	Required	College of Engineering	b2011188	Introduction to Engineering	non-test	1	16	16	0	Autumn 1
	Required	College of Engineering	b2011246	Modern Engineering Drawing	test	4	64	40	24	Autumn 1
	Required	College of Engineering	b2011049	Engineering Mechanics I	test	3	48	48	0	Spring 1
	Required	College of Engineering	b2011397	Foundation of Engineering Material	test	2	32	28	4	Spring 1
	Required	College of Engineering	b2011050	Engineering Mechanics II	test	3	48	44	4	Autumn 2
	Required	College of Engineering	b2011310	Mechanical principle and mechanism innovation design	test	4	64	50	14	Autumn 2
	Required	Engineering Training Center	b2090001	Electrician and Electronics	test	3	48	42	6	Spring 2
	Required	College of Engineering	b2011077	Mechanical Design	test	3	48	45	3	Spring 2
	Required	College of Engineering	b2011312	Mechanical Manufacturing Technology	test	4	64	56	8	Spring 2
	Required	College of Engineering	b2011465	Thermodynamics and Heat Transfer	Non-test	4	32	32		Autumn 3
	Required	College of	b2011047	Principles of Engineering Control	test	2	32	30	2	autumn3

		Engineering								
	Required	College of Engineering	b2011016	Testing Technology	non-test	2	32	26	6	Spring 3
Sub-total (Basic courses)						31	496	429	67	
Professional courses	Required	College of Engineering	b2011311	CNC system and principle	test	2	32	28	4	Spring 2
	Required	College of Engineering	b2011152	Hydraulic and Pneumatic Transmission	Test	2	32	28	4	Autumn 3
	Required	College of Engineering	b2011120	CNC machine tools and programming	Test	3	48	40	8	Spring 3
	Required	College of Engineering	b2011055	Industrial Robots and Applications	Non-test	2	32	24	8	Spring 3
	Sub-total (required professional courses)					11	176	148	28	
	Selective 8 credits	College of Engineering	b2011182	Programmable Controller (PLC)	non-test	2	32	24	8	Autumn 3
		College of Engineering	b2011181	Electromechanical Drive Control	non-test	2	32	24	8	Autumn 3
		College of Engineering	b2011469	Precision and ultra-precision processing technology	non-test	2	32	26	6	Spring 3
		College of Engineering	b2011141	Theory and Method of Modern Design Theory	non-test	2	32	26	6	Autumn 4
		College of Engineering	b2011135	Advanced Manufacturing Technology	non-test	2	32	26	6	Autumn 4
		College of Engineering	b2011395	Mechanical design practice	non-test	2	32	16	16	Autumn 3
	Trans-disciplinary course		b2011396	Intelligent Manufacturing Execution	non-test	2	32	26	6	Spring 3

			System(MES)					
	Sub-total l (selective professional courses)				10	160	118	42	
Sub-total (professional courses)					19	304	238	66	

11. Teaching schedule (3)

Category	Type	Provided by	Course Code	Course Name	Assessment	Credit	Course Hour	Theory Learning	Practical Training	Semester
Practical Training	Required	College of Engineering	b4011088	Modern Engineering Drawing Surveying and Mapping	non-test	2	48		48	Summer 1
	Required	College of Engineering	b4011282	Interchangeability and measurement technology practice B	non-test	3	72		72	Summer 1
	Required	College of Engineering	b4011106	Corporate Awareness Internship	non-test	1	24		24	Summer 2
	Required	Engineering Training Center	b4090005	Electrician Skill Internship	non-test	1	24		24	Summer 2
	Required	College of Engineering	b4011183	Mechanical Manufacturing Course Practice	non-test	2	48		48	Summer 2
	Required	College of Engineering	b4011059	Computer-Aided Design and Manufacturing Practice	non-test	3	72		72	Autumn 3
	Required	College of Engineering	b4011285	Mechanism and Process Regulation Design Practice	non-test	2	48		48	Autumn 3
	Required	College of Engineering	b4011328	Mechanical system design and precision manufacturing project integration	non-test	3	72		72	Spring 3
	Required	College of Engineering	b4000012	Innovation and Entrepreneurship in Mechanical Engineering	non-test	2	48		48	Spring 3
	Required	College of Engineering	b4011283	Failure Analysis and Practice of Numerical Control Equipment	non-test	2	72		72	Summer 3
	Required	College of	b4011329	Comprehensive Practice of CNC	non-test	3	72		72	Summer 3

		Engineering		Machining						
	Required	College of Engineering	b4011256	Multi-axis machining and simulation practice	non-test	2	48		48	Autumn 4
	Required	College of Engineering	b4011264	Comprehensive Practice of Mechanical Engineering	non-test	3	72		72	Autumn 4
	Required	College of Engineering	b4011339	Labor Education B	non-test	0.5	16		16	Spring 3
	Required	College of Engineering	b4011247	Graduation Practice and Graduation Design of Mechanical Engineering (Thesis)	non-test	6	288		288	spring4
Sub-total (professional practice)						35.5	1024		1024	
Extracurricular Class	Required	Others	b5110001	Extracurricular Class	non-test	1	-	-	-	Autumn, spring, summer
Total						155	88	1837	1251	

Professional certificates can be gained after learning following courses:

Students of mechanical engineering program can choose the following certificates:

(1) UG/Solidworks, Advanced Certificate, National CAD Center

(2) Milling worker (CNC milling worker)/turning worker (CNC turning worker), intermediate/advanced skill certificate, Shanghai Vocational Skills Appraisal Center

(3) Qualification certificate of trainee mechanical design engineer, Chinese Mechanical Engineering Society

Through the study of courses including "Modern Engineering Drawing", "Modern Engineering Drawing Surveying and Mapping", and "Computer Aided Design and Manufacturing Practice", students can participate in the vocational qualification certificate assessment: UG/Solidworks, advanced certificate, national CAD center.

Through the study of courses including "CNC machine tools and programming", "Mechanical Manufacturing Technology", and "Comprehensive practice of CNC machining", students can participate in the vocational qualification certificate assessment: Milling (CNC milling) three-level certificate, Shanghai Vocational Skills Appraisal Center.

12. Prerequisite for Course Study

No.	Course Name	Prerequisite Course	No.	Course Name	Prerequisite Course
1	Engineering Mechanics I	Advanced Mathematics A1	7	CNC machine tools and programming	Modern Engineering Drawing
		Advanced Mathematics A2			Mechanical Design
		College Physics			Mechanical Manufacturing Technology
2	Mechanical principle and mechanism innovation design	Advanced Mathematics A1	8	Advanced Manufacturing Technology	Modern Engineering Drawing
		Advanced Mathematics A2			Mechanical Design
		Engineering Mechanics I			Mechanical Manufacturing Technology
3	Mechanical Design	Engineering Mechanics I	9	Hydraulic and Pneumatic Transmission	Advanced Mathematics A1
		Engineering Mechanics II			Advanced Mathematics A2
		Modern Engineering Drawing			Modern Engineering Drawing
		Mechanical principle and mechanism innovation design			College Physics
4	Electrician and Electronics	Advanced Mathematics A1	10	Computer Aided Design and Manufacturing Practice	Modern Engineering Drawing
		Advanced Mathematics A2			CNC machine tools and programming
		College Physics			Mechanical Manufacturing Technology
5	Principles of Engineering Control	Advanced Mathematics A1	11	Mechanical Design Practice	Mechanical principle and mechanism innovation design
		Advanced Mathematics A2			Mechanical Design
		College Physics			Computer Aided Design and Manufacturing Practice
		Electrician and Electronics			
6	Mechanical Manufacturing	Modern Engineering Drawing	12	Testing technology	Electrician and Electronics
		Foundation of Engineering			College Physics

	Technology	Material			
		Interchangeability and measurement technology practice			

13. Extracurricular Class

Through taking extracurricular classes, students are encouraged to take part in academic lectures, social practice activities, campus cultural and sports activities, innovative and entrepreneurial activities, voluntary activities, etc. to improve their social adaptability and enhance the competitiveness in the job market. Details are specified in Students' Manual.