Intelligent Manufacturing Engineering

080213T 4

Program Code: 080213T Duration 4 years

(Educational Objectives)

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In order to actively respond to the national innovation-driven development strategy and the strategic needs of the new generation of artificial intelligence development planning, a new engineering major of intelligent manufacturing engineering has been established to cultivate high-level intelligent manufacturing talents urgently needed for industrial development. This major is a strong cross-discipline of artificial intelligence and high-end manufacturing. Through the deep integration of Intelligent Technology (smart+), Mechanical Engineering, Electronic Engineering and Control Engineering, it focuses on cutting-edge scientific research in the field of intelligent manufacturing and conducts multi-disciplinary joint research to tackle key problems of intelligent manufacturing area, and aims to cultivate scientific and technological talents with global competitiveness in intelligent manufacturing.

Students will achieve the following objectives in 5 years after graduation:

1. An ability of research and innovation in the field of Intelligent Manufacturing Engineering.

2. An ability of critical thinking to discover, analyze, and solve problems.

3. An ability of written expression and communication of cross-domain, cross-cultural, and cross-border.

4. An ability of team leadership with holistic view, coordination, tolerance, and execution.

5. An ability to engage in lifelong learning and further develop in the field of Intelligent Manufacturing Engineering.

(Student Outcomes)

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№11.

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№12. 。

№1.Engineering Knowledge: An ability to apply knowledge of mathematics, science, engineering fundamentals and engineering specialization to the solution of complex engineering problems.

№2.Problem Analysis: An ability to identify, formulate and analyze complex engineering problems, reaching to substantiated conclusions using basic principles of mathematics, science, and engineering.

№3.Design/Development Solutions: An ability to design solutions for complex engineering problems and innovatively design systems, components or process that meet specific needs with societal, public health, safety, legal, cultural and environmental considerations.

№4.Research: An ability to conduct investigations of complex engineering problems based on scientific theories and adopting scientific methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

№5.Applying Modern Tools: An ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities, with an understanding of the limitations.

№6.Engineering and Society: An ability to apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering

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The Intelligent Manufacturing Engineering major is an undergraduate program that focuses on cutting-edge high-tech in intelligent engineering and its application. It is also a major that combines computer science and engineering, mechanical engineering, automation engineering, electrics and electronics engineering, and other disciplines. This major brings together outstanding scientific research talents in the field of intelligent manufacturing from around the world; studies cutting-edge science and technology, including basic theories and scientific issues in artificial intelligence, intelligent manufacturing, robotics, autonomous driving technology, smart cities, and intelligent medical care; cultivates talents for intelligent science and technology with global competitiveness; and carries out world-leading scientific research. As the most advanced academic program in the field of intelligent manufacturing, our program in intelligent manufacturing engineering aims at educating students with solid academic fundamentals, multidisciplinary background, practice orientation vision, and great creativity. We will train the students to utilize academic knowledge in practical applications, and work in a team with great organization and coordination skills. Eventually, the graduates are expected to possess the advantage of integrating and mastering knowledge in multiple disciplines, which significantly provides them a wide range of job opportunities and promising prospects for further studies. Our school has now fully adopted the undergraduate education system of the University of Michigan in the US. We own the most advanced laboratories and research and practice platforms for internship. The complete talent cultivation system has

enterprises and institutions, government organizations etc. They can also apply to graduate schools to become graduate students in Robotics Engineering, Intelligent Manufacturing, and other related majors, so as to seek broader development opportunities.

(Program Features)

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2. ABET 。
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1. Intelligent Manufacturing Engineering emphasizes on a multidisciplinary teaching method, encompassing an engineering-orientated integration of courses and topics from mechanical engineering, automation engineering, electronics and telecommunications, computer engineering, and featuring a highly interdisciplinary Emerging Engineering Education.

2. The program is designed and built on the concept of discipline construction from University of Michigan and the requirements of ABET accreditation. The program aims to establish an innovative teaching method, able to train the students to gain an international perspective and apliNiovndst.

Applications in Industry, Analytics and Design of Manufacturing Systems, Mechatronics, Introduction to Engineering, Sensor and its Applications, Embedded Systems and Design, Data Structures and Algorithms

（Featured Courses）

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- Freshmen Innovative Seminars: Introduction to Engineering Ⅱ
- Subject Frontiers Courses: Analytics and Design of Manufacturing Systems, Big Data Analytics and Applications in Industry
- Innovation Practice: Design and Manufacturing Ⅰ,Design and Manufacturing Ⅱ
- Entrepreneurship Courses: Product Development ("Three ones" Courses)
- Special Designs:Design and Manufacturing Ⅰ, Design and Manufacturing Ⅱ
- Labor Education Courses: Capstone (Thesis)

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、 (Courses Schedule)

Course Category	Course No.	Course Title	C/E	Total Curriculum Hours				Credits	Semester	Student Outcomes
				Class Hours	Lab Hours	Practice Hours	Other Hours			
	031101761		C	48				3.0	1	№8
	031101661	Ethics and Rule of Law	C	40			4	2.5	2	№8
	031101371	Skeleton of Chinese Modern History	C	40			4	2.5	3	№8
	031101522	Introduction of u								
General Basic Courses										

	052100012	（ ） Physical Education (2)	C	36			36	1.0	2	№12
	052100842	（ ） Physical Education (3)	C	36			36	1.0	3	№12
	052100062	（ ） Physical Education (4)	C	36			36	1.0	4	№12
	006100112	Military Principle	C	36			18	2.0	2	№8,9
	040102631	Ⅱ（ ） Calculus Ⅱ (1)	C	80				5.0	1	№1,2,4
	040102641	Ⅱ（ ） Calculus Ⅱ (2)	C	80				5.0	2	№1,2,4
	040102601	Linear Algebra & Analytic Geometry	C	48				3.0	1	№1
	040100026	Probability & Mathematical Statistics	C	48				3.0	2	№1
	041101155	Ⅲ（ ） General Physics Ⅲ (1)	C	64				4.0	2	№1,2,4
	041100671	（ ） Physics Experiment (1)	C	32	32			1.0	2	№1,2,4
	041100344	Ⅲ（ ） General Physics Ⅲ (2)	C	64				4.0	3	№1-5
	041101051	（ ） Physics Experiment (2)	C	32	32			1.0	3	№1-5
	037102786	General Chemistry	C	32				2.0	1	№1-3
	037101943	General Chemistry Experiment	C	16	16			0.5	2	№1-3
		Humanities	E	128				8.0	2-8	№8
		Social Science							2-8	№8
		Science and Technology		32				2.0	2-8	№8
	Total			**1244**	**80**		**198**	**67.5**		

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、 （ ）(Courses Schedule)

Course Category	Course No.	Course Title	C/E	Total Curriculum Hours				Credits	Semester	Student Outcomes
				Class Hours	Lab Hours	Practice Hours	Other Hours			
Specialty Basic Courses	082100262	Introduction to Engineering Ⅱ	C	60				4.0	1	№1-3,5-7,9-11
	082100451	Data Structures and Algorithms	C	64			16	4.0	3	№1-3
	082100241	Big Data Analytics and Applications in Industry	C	48			20	3.0	3	№1-6,9-11
	082100601	Engineering Mechanics	C	64				4.0	3	№1-5
	082100701	Introduction to Circuits	C	48				3.0	3	№1-6,9-11
	082100251	Thermodynamics and Fluid Mechanics	C	64				4.0	4	№1-7
	082100281	Introduction to Dynamics and Vibration	C	64				4.0	4	№1-8,12
	082100671	Design and Manufacturing Ⅰ	C	48				3.0	4	№1-3,5-7,9-11
	082100162	Artificial Intelligence and its Application	C	48			12	3.0	4	№1,5,10

	082100291	、 Modeling, Analysis, and Control of Dynamic System	C	64				4.0	5	№1-3,5,10
	082100091	Data Analysis and Modeling	C	64			24	4.0	5	№1,4,5,9,10
	082100711	Embedded Systems and Design	C	48				3.0	5	№1-6,9-11
	082100661	Ⅱ Design and Manufacturing Ⅱ	C	48				3.0	6	№1-3,5-7, 9-11
	082100021	Analytics and Design of Manufacturing Systems	C	48				3.0	6	№1,2,5,6,8,12
	082100541	Classical Control Theory	C	48			5	3.0	6	№1-5,10
	Total		**C**	**828**			**77**	**52.0**		
Elective Courses	082100731	Python Python Programming Foundations	E	48			20	3.0	2	№1, 3, 5,11
	082100611	Computer Networks	E	64	16			4.0	4	№1-3
	082100631	Product Development	E	48				3.0	5	№2,3,5
	082100511	Smart Factory	E	48				3.0	6	№2-7,11
	082100481	Sensor and its Applications	E	48				3.0	6	№1-6,9
	082100621	Signal Processing	E	60	12			4.0	6	№1,3,5
	082100741	Natural Language Processing	E	48			20	3.0	6	№1, 3, 5,11

	082100221	Mechatronics	E	48	16			3.0	7	№1-8
	082100301	PLC Electrical Control and PLC	E	48	8			3.0	7	№1-3,5-8,10-11
	082100071	Modern Control Theory	E	48			12	3.0	7	№1-6,9-11
	082100491	Flexible Electronic Design and Manufacturing	E	32	10			2.0	5 7	№1-7,9
	082100471	Databases	E	32			8	2.0	5 7	№1-3
	082100551	Autonomous Driving Systems	E	48				3.0	7	№1-7,10
	082100571	Introduction to Internet of Things	E	32				2.0	8	№1-5
	082100521	Advanced Manufacturing Technology	E	48				3.0	8	№1-6,8,12
	082100561	Software Engineering	E	48	16			3.0	8	№1-3
			E	32				2.0	5	
	020100051	Innovation Research Training	E	32				2.0	7	№3,4
	020100041	Ⅰ Innovation Research Practice Ⅰ	E	32				2.0	7	№3,4
	020100031	Ⅱ Innovation Research Practice Ⅱ	E	32				2.0	7	№3,4
	020100061	Entrepreneurial Practice	E	32				2.0	7	№3,9,11
	Total		**E**	**10.0 minimum elective course credits required:**						

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、 (Practice-concentrated Training)

Course No.	Course Title	C/E	Total Curriculum Hours		Credits	Semester	Student Outcomes
			Practice weeks	Lecture Hours			
006100151	Military Training	C	2		2.0	1	№9
082100691	II Practice of Introduction to Engineering II	C	2		2.0	1	№1-3,5-7,9-11
031101551	Marxism Theory and Practice	C	2		2.0	3	№8
082100641	Practice of Introduction to Circuits	C	2		2.0	3	№1-6,9-11
082100651	I Practice of Design and Manufacturing I	C	2		2.0	4	№1-3,5-7,9-11
067101783	III Engineering Innovation Training III	C	4		4.0	4	№3,4,6,7,11

082100721	Practice of Embedded Systems and Design	C	2		2.0	5	№1-6,9-11
082100681	II Practice of Design and Manufacturing II	C	2		2.0	6	№1-3,5-7,9-11
082100501	( ) Capstone (Thesis)	C	18		10.0	7-8	№1-12
Total		**C**	**36**		**28.0**		

、 ("Second Classroom" Activities)

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4."Second Classroom" Activities

"Second Classroom" Activities are comprised of two parts, Humanities Quality Education and Innovative Ability Cultivation.

1) Basic Requirements of Humanities Quality Education

Besides gaining course credits listed in one's subject teaching curriculum, a student is required to participate in extracurricular activities of Humanities Quality Education based on one's interest, acquiring no less than three credits. The advanced undergraduates must complete one of courses of Humanities Quality Education which has seventy-two class hours (it's equivalent to one credit which belongs to Humanities Quality Education Credit of Extracurricular Class) offered by the College Physical Education Teaching Group.

2) Basic Requirements of Innovative Ability Cultivation

Besides gaining course credits listed in one's subject teaching curriculum, a student is required to participate in any one of the following activities: National Undergraduate Training Programs for Innovation and Entrepreneurship, Guangdong Undergraduate Training Programs for Innovation and Entrepreneurship, Student Research Program (SRP), One-hundred-steps Innovative Program, or any other extracurricular activities of Innovative Ability Cultivation that last

a certain period of time (e.g. subject contests, academic lectures), acquiring no less than four credits.