Wuxi University

Objectives and Learning Outcomes

Department of Electrical Engineering and Automation
School of Automation

2025

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I. Objectives of the Programme

The programme of Electrical Engineering and Automation adheres to the fundamental task of moral education, adapts to the needs of regional economic and social development. Moreover, this major is committed to cultivating innovative engineering and technical talents who possess a strong sense of social responsibility and high comprehensive literacy, all-around development of moral, intellectual, physical, aesthetic and labor education, and solid theoretical foundation and professional skills.

After four years of study, students will first gain a solid foundation in mathematics and science, as well as develop good humanistic literacy and communication skills. Second, students will systematically master the professional knowledge in the fields of new energy power generation, intelligent micro-grid and intelligent manufacturing, and have the ability to discover, analyze and solve complex engineering problems. Third, students will also have engineering application and management skills in energy, electronics, communications, industry and transportation, as well as a broad international perspective and a sense of lifelong learning. Finally, students will be able to work both independently and cooperatively within a team, and be able to organize and coordinate team members to achieve goals.

II. Programme Learning outcomes

1. Engineering Knowledge: Be able to apply mathematics, natural sciences, engineering fundamentals, and professional knowledge to solve complex engineering problems in areas such as New Energy Power Generation and Smart Microgrid and Smart Manufacturing and High-end Equipment.

●1.1: Be able to apply knowledge of mathematics and natural sciences to the formulation of engineering problems.

●1.2: Be able to apply principles of mechanics, circuits, and signal analysis relevant to specialized fields such as New Energy Power Generation and Smart Microgrids, and Intelligent Manufacturing and High-end Equipment, to identify and articulate problems related to mechanical components, electrical circuits, and signals.

●1.3: Be able to develop and solve mathematical models for specific objects such as circuits, signals, systems, or processes within electrical systems related to New Energy Power Generation and Smart Microgrids, and Intelligent Manufacturing and High-end Equipment.

●1.4: Be able to understand the concept of a system and its application in fields like New

Energy Power Generation and Smart Microgrids, and Intelligent Manufacturing and High-end Equipment; and to apply professional knowledge and mathematical modeling methods to compare and synthesize solutions for complex engineering problems within these electrical systems.

2. Problem Analysis: Be able to identify, formulate, and analyze complex engineering problems in areas such as New Energy Power Generation and Smart Microgrid and Smart Manufacturing and High-end Equipment by applying fundamental principles of mathematics, natural sciences, and engineering sciences, and conduct literature research to arrive at valid conclusions.

●2.1: Be able to identify and ascertain the critical stages and parameters in problems related to New Energy Power Generation and Smart Microgrids, and Intelligent Manufacturing and High-end Equipment, by applying fundamental principles of mathematics, physics, and engineering sciences.

●2.2: Be able to decompose complex systems into modular representations and analyze the performance of units and components within systems such as New Energy Power Generation and Smart Microgrids, and Intelligent Manufacturing and High-end Equipment, using scientific principles and mathematical models.

●2.3: Be able to analyze influencing factors and formulate preliminary solutions for complex engineering problems in electrical systems related to New Energy Power Generation and Smart Microgrids, and Intelligent Manufacturing and High-end Equipment, based on specified performance indicators, by applying fundamental engineering principles and conducting literature research to justify the solutions' validity and articulate them correctly.

3. Design/Development of Solutions: Be able to design solutions for complex engineering problems in the development or integration of systems for New Energy Power Generation and Smart Microgrid and Smart Manufacturing and High-end Equipment. Design systems (devices) or units (components) that meet specific requirements, while demonstrating innovative thinking and considering factors such as society, health, safety, legal, cultural, and environmental impacts throughout the design process.

●3.1: Be able to define design objectives, content, and specifications based on user needs or task requirements.

●3.2: Be able to consider social, health, safety, legal, cultural, and environmental constraints; analyze the impact of parameters within units or subsystems; and propose and

conduct feasibility analysis on design solutions that meet specified objectives.

●3.3: Be able to conduct specific requirements analysis for complex engineering problems in electrical systems related to New Energy Power Generation and Smart Microgrids, and Intelligent Manufacturing and High-end Equipment; perform component parameter calculation, process requirement analysis, and functional analysis through modeling and simulation; and complete the design of hardware circuits and software modules for units or subsystems, demonstrating innovative awareness.

4. Research: Be able to conduct research on complex engineering problems in the development or integration of systems for New Energy Power Generation and Smart Microgrid and Smart Manufacturing and High-end Equipment based on scientific principles and using scientific methods. This includes designing experiments, analyzing and interpreting data, and synthesizing information to draw reasonable and valid conclusions.

●4.1: Be able to design simulation or experimental protocols to analyze key issues in the development or integration of electrical systems for New Energy Power Generation and Smart Microgrids, and Intelligent Manufacturing and High-end Equipment, based on scientific principles and methods.

●4.2: Be able to construct experimental systems according to the protocol, conduct experiments safely, collect and record data accurately, and verify data repeatability.

●4.3: Be able to analyze and interpret data or phenomena from developmental practices in electrical systems for New Energy Power Generation and Smart Microgrids, and Intelligent Manufacturing and High-end Equipment, and to derive reasonable and valid conclusions through information synthesis to support the resolution of complex electrical engineering problems.

5. Use of Modern Tools: Be able to develop, select, and use appropriate technologies, modern instrumentation, system simulation and design software, and information technology tools for complex engineering problems in New Energy Power Generation and Smart Microgrid and Smart Manufacturing and High-end Equipment, particularly in component selection, module design, and system integration. This includes predicting and simulating the effectiveness of solutions for complex engineering problems and understanding their limitations.

●5.1: Be able to select and use modern instruments, system simulation and design software, and information technology tools common to the profession, and to understand their limitations.

●5.2: Be able to apply appropriate modern engineering tools for simulation to model, analyze, and predict complex engineering problems in fields such as New Energy Power Generation and Smart Microgrids, and Intelligent Manufacturing and High-end Equipment, and to understand their limitations.

6. Engineer and Society: Be able to analyze relevant background knowledge in New Energy Power Generation and Smart Microgrid and Smart Manufacturing and High-end Equipment. Evaluate the impact of professional engineering practice and solutions to complex engineering problems on society, health, safety, legal, and cultural aspects, and understand the responsibilities that accompany such practice.

●6.1: Knowledge of technical standards, intellectual property, industrial policies, and legal regulations relevant to the professional field, and an understanding of the impact of diverse social and cultural contexts on engineering activities.

●6.2: Be able to analyze and evaluate the impact of professional engineering practices on society, health, safety, law, and culture within the practical application contexts of projects like New Energy Power Generation and Smart Microgrids, and Intelligent Manufacturing and High-end Equipment, and to understand the corresponding responsibilities.

7. Environment and Sustainability: In the engineering practice of solving complex engineering problems in New Energy Power Generation and Smart Microgrid and Smart Manufacturing and High-end Equipment, be able to understand and evaluate their impact on the environment and social sustainability.

●7.1: An understanding of the principles of environmental protection and sustainable development, knowledge of relevant national environmental laws and regulations, and an appreciation of the impact of practices in New Energy Power Generation and Smart Microgrids, and Intelligent Manufacturing and High-end Equipment on the environment and social sustainability.

●7.2: Be able to assess the sustainability of engineering practices in New Energy Power Generation and Smart Microgrids, and Intelligent Manufacturing and High-end Equipment from an environmental and sustainable development perspective, and to evaluate potential harm and risks to humanity and the environment throughout the project lifecycle.

8. Ethics: Possess humanistic and social science literacy and a sense of social responsibility. Be able to understand and adhere to engineering ethics and professional codes of conduct in engineering practice, and fulfill professional responsibilities.

●8.1: A commitment to sound values, an understanding of the relationship between the

individual and society, knowledge of national conditions, and a dedication to upholding national interests.

●8.2: An understanding of the engineer's social responsibility for public safety, health, and welfare, as well as environmental protection, and the ability to consciously fulfill these responsibilities in engineering practice.

9. Individual and Teamwork: Be able to assume the roles of an individual, team member, and team leader within a multidisciplinary team.

●9.1: Be able to share information and collaborate effectively with members of other disciplines.

●9.2: Be able to function independently or collaboratively on a team to carry out work related to engineering fields such as New Energy Power Generation and Smart Microgrids, and Intelligent Manufacturing and High-end Equipment, demonstrating organizational, coordination, and management skills.

10. Communication: Be able to communicate effectively with peers in the industry and the general public regarding complex engineering problems in the development or integration of electrical systems for New Energy Power Generation and Smart Microgrid and Smart Manufacturing and High-end Equipment. This includes writing reports and design documents, presenting findings, and clearly communicating and responding to instructions. Demonstrate an international perspective and the ability to communicate across cultural backgrounds.

●10.1: Be able to communicate effectively on complex engineering issues with professional peers and the public through presentations, design documents, and written reports; to articulate viewpoints clearly, respond to inquiries, and understand the differences in communication with diverse audiences.

●10.2: A capacity for cross-cultural communication, including language and written expression skills; an awareness of international trends and research hotspots in the electrical engineering field; and an understanding and respect for the diversity of world cultures, enabling basic communication on professional issues in a cross-cultural context.

11. Project Management: Understand and master principles of engineering management and economic decision-making, and be able to apply them in engineering practice within a multidisciplinary environment.

●11.1: An understanding of the importance of engineering management and economic decision-making in engineering practice, particularly for electrical engineering problems, and

a grasp of their fundamental principles and methods.

●11.2: Be able to apply principles of engineering management and economic decision-making in the process of research, design, development, and implementation of solutions to complex engineering problems in the electrical field within a multidisciplinary environment (including simulated environments).

12. Life-long Learning: Possess an awareness of self-directed and life-long learning, and have the ability to continuously learn and adapt to advancements in the field.

●12.1: An understanding of the diverse technological landscape and the impact of technological advancements on knowledge and skill requirements, with an ability to track and identify knowledge developments and new research directions in the electrical field.

●12.2: A demonstrated capacity for autonomous learning, including the ability to comprehend technical issues, synthesize information, and formulate questions.

III. Models

Module 1: Mathematics and Physics

- Learning objective: To master the relevant knowledge of mathematics, physics and natural science, and to lay a solid foundation for subsequent courses. The ability to apply basic knowledge to analyze and solve practical problems.
- Learning outcomes: Ability to use knowledge of mathematics, physics and natural sciences to understand and express technical problems; Ability to construct basic models to analyze and solve practical problems in engineering; The ability to observe, analyze and solve practical engineering problems using mathematical methods; Ability to analyze, calculate and synthesize phenomena in engineering sciences based on mathematical, physical and natural science knowledge.
- Related courses: Advanced Mathematics I (1), Advanced Mathematics I (2), Linear Algebra, Probability Theory and Statistics, Complex Function Theory and Integral Transforms, College Physics II (1), College Physics II (2), College Physics Experiment II.

Module 2: Engineering Fundamentals

- Learning objective: To master the basic professional knowledge and lay a solid foundation for the study of professional courses.
- Learning results: Master the basic knowledge of electronics, engineering drawing,

electrical engineering, control engineering, etc. Ability to analyze and solve practical engineering problems.

- Related courses: Major Introduction, Principle and Application of PLC, Sensor and Detection Technology, New Energy Generation and Inverter Technology, AC and DC Speed Regulation System, Power System Modeling and Simulation, Power Supply and Distribution Technology.

Module 3: Engineering Applications

- Learning objective: to master solid professional knowledge, and have a strong ability to use professional knowledge.
- Learning outcomes: Mastering the general methods and skills needed to solve practical engineering problems; Continuous analysis, summary and inspection of phenomena in engineering according to the characteristics of electrical engineering.
- Related courses: Engineering Drawing, Circuit Theory, Fundamentals of Analog Electronics, Fundamentals of Digital Electronics, Digital Electronics Experiments, Signals and Systems, Microcomputer Principle and Micro-controller Technology, Microcomputer Principle and Micro-controller Experiment, Automatic Control Theory, Electromagnetic Field in Engineering, Fundamentals of Electrical Engineering, Motor and Drive System, Power Electronics, Power System Analysis, Power System Relaying Protection.

Module 4: Elective Courses

- Learning objective: According to students' course interests and career development needs, meet the personalized learning needs, further expand students' professional knowledge and improve students' knowledge application level.
- Learning outcomes: Master multi-disciplinary and multi-dimensional knowledge, and have the skills of interdisciplinary integration required for career development.
- Related courses: Fundamentals of Mechanical Design, Artificial Intelligence, Energy Storage Technology and Application, Engineering Ethics, Engineering Economics, Engineering Project Management, Engineering Creation, Fundamentals of Information and Communication Network.

Module 5: Foreign Language

- Learning objective: To have intercultural communication skills and international cooperation skills.
- Learning outcomes: Knowledge required to pass the College English Test Level 4 (CET-4). Able to find and read professional English literature, and able to communicate professional questions in English. Have cross-cultural communication skills necessary for career development.
- Related courses: General English (1), General English (2), General English (3), and General English (4).

Module 6: General Courses

- Learning objective: To understand the Chinese social model and social norms. Have good quality, team spirit and humanistic feelings. To achieve the all-round development of morality, intelligence, physical, aesthetic and labor education.
- Learning outcomes: Understand social phenomena, pay attention to and adapt to social development. Communicate and cooperate effectively with others. Be a team player, promote physical and Psychological Health and self-improvement, and have a sound personality and psychological quality. To establish correct outlook on life, values, Ideology, Morality and the Rule of Laws; And possess humanistic quality and social responsibility.
- Related courses: Situation and Policy, Ideology Morality and Rule of Law, Modern Chinese History, Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, Marxism Basic Theory, Introduction to Mao Zedong Thought and Theory of Socialism with Chinese Characteristics, C Language Programming, Psychological Health Education, Career Development, Employment Guidance, Innovation and Entrepreneurship Foundation, Physical Education, Military Theory, Social Practice, and Labor Studies for College Students.

Module 7: Practical Courses

- Learning objective: To enable students to consolidate theoretical knowledge, deepen understanding of applied knowledge, and be able to analyze and evaluate complex engineering problems and propose solutions.
- Learning outcomes: Mastering the ability to analyze and solve practical problems

in electrical engineering. Master the basic methods and techniques of engineering design and process development, and understand the various factors that affect the technical scheme. Have the ability to apply engineering knowledge to analyze and evaluate problems and understand their limitations. And the ability to design innovatively and find valuable solutions.

- Related courses: Cognitive Practice, Metalworking Practice, Electrical and Electronic Practice, Academic Writing, Power Electronics Comprehensive Practice, Motor and Drive Comprehensive Practice, Power System Relaying Protection Comprehensive Experiment, Electrical Engineering Comprehensive Design, Graduation Practice, PLC Application Innovation Design, AC and DC Speed Regulation Comprehensive Design, Micro-controller Application Design, New Energy Generation and Application Comprehensive Design, Low Voltage Power Distribution Comprehensive Design, Energy Storage Technology and Application Comprehensive Design, Winding Wire Design and Processing Test, Power Quality Design and Test, Innovation and Entrepreneurship Practice.

Module 8: Bachelor's Thesis

- Learning objective: To be able to propose solutions and complete practical projects on the basis of analyzing practical problems.
- Learning achievement: Able to complete the writing of the Bachelor's Thesis with the help of the instructor, and pass the graduation defense.
- Related courses: Graduation Design (Dissertation).