BTBU Master of Control Theory and Control Engineering

Discipline class: Engineering
Primary discipline: Control Science and Engineering
Sub-discipline: Control Theory and Control Engineering
Sub-discipline code: 081101

一、Program Overview

The program aims to educate experts in automation and control field to adapt to China's socialist modernization and capital modern service industry and modern manufacturing.

1. The program aims to educate senior professionals in control field in research and development, design, implementation and management. It is to enable students to have the basic theories and systematic knowledge in control science, information processing and artificial intelligence fields, to know academic trends and advancement in this field, to have the potential in independently bear a special technology work, to have high overall quality, innovative thinking and enterprising spirit, and to master a foreign language.

2. The program aims to enable students to have the team spirit and credit awareness, innovative thinking and ability.

二、Research Fields

1. Pattern recognition and intelligent information processing system

The research focus on advanced technology and intelligent system of pattern recognition theory and application research, the comprehensive application of artificial intelligence, neural network and fuzzy logic and pattern recognition theory
and technology of intelligence based on machine vision to solve the light industrial products and agricultural and sideline products quality feature extraction and pattern recognition problem. In the construction of intelligent system, the information technology and control technology and biology, physiology, psychology is combined, and the biological information identification, brain type information processing new intelligent information processing method is researched.

2. Intelligent control and optimization control research direction

The research focus on intelligent control and optimization control theory and method, forming a learning and adaptive ability, man-machine coordinated, with advanced technology and intelligent control algorithm and control as the core of the optimization control system, and solve the complex mathematical modeling of the production process and real-time control, economic index optimal control problem. The main characteristics is that intelligent measurement and optimization control method is applied to light industry production, the water environment protection and control and other fields, and achieve quality parameters of the soft measurement and online with large lag time control of the production process.

3. The embedded system and network control

The research focus on comprehensive application embedded technology and network measurement and control theory and method, the hot technical problems in control engineering, depth theoretical research and practical application, to solve the embedded chip system, micro controller, SOPC MCU embedded digital signal processor (DSP) in all kinds of intelligent robot, intelligent instrument, intelligent controller, intelligent detection instrumentation, as well as all kinds of embedded system in network measurement and control (including wireless sensor technology, GPRS, GPS and Bluetooth wireless technology) terminal equipment application technology.

4. Nonlinear chaos theory and secret communication and information encryption technology

The research focus on using the modern control theory and the theory of intelligent control chaotic control and synchronization problems research, seek and
modern communication technology and the combination of cryptography, development of chaos synchronization secret communication technology and chaotic cryptography. In the application by using DSP technology, network data communication technology and Java software technology, voice, video communication security system and network information encryption system is developed.

5. Intelligent decision support system

The research focus on comprehensive use of operations research, artificial intelligence, the science of decision making, complex adaptive system theory and method, and the application of computer technology, to study and solve system modeling, analysis, design, optimization and decision making problems of the theory, technology and method, in order to achieve the optimal planning, the optimal design, the best management and optimal control purpose. The main characteristic is business intelligence system with dynamic optimization decision mechanism, material system security, storage and logistics intelligent decision support system, logistics barcode and radio frequency technique.

三、 Duration of study

3 Years.

四、 Due credit hour

Total credits are not fewer than 32, in which:

1. Public foundation course: 7 credits
2. Discipline foundation course: 9 credits
3. Professional backbone course: 8 credits
4. Professional elective course: 8–9 credits
At the same time, 2 credits are from other compulsory activities. Based on completing the above provisions in the credits; students can take courses in other department under the guidance of teachers.

五、Courses

1. Courses

The professional courses are divided into degree compulsory courses and non-degree elective courses. The degree required course (including three kind: public basic courses, disciplines basic courses, main courses), total 24 credits. The selected non-degree elective courses listed in the teaching program should be not less than eight credits under the guidance of the instructor, including basic course crossing 1 level subject 2-3 credits, main course crossing 2 level subject 2 credits, professional elective courses 4 credits.

2. Additional course

Equivalent and cross-professional admission graduate students should supplement 2 ～

3. Courses corresponding undergraduate main course under the guidance of the instructor, and should passing the examination. No credits.

六、Required process

1. Academic Seminar (1 credit)

Master students must participate in at least 20 seminars, academic report or graduate forum organized by graduate school or department.

2. Social practice and teaching practice (1 credit)

Social practice is mainly to participate in social surveys, commitment to internal and external research, design, research, consulting, technology development and services activities. Teaching practice is an important part of training of graduate students, teaching practice is mainly armed at undergraduate students for the object to
carry out lecture, counseling, guidance experiments and supporting guidance graduating student thesis or graduation project.

七、Dissertation

The dissertation is an important part of postgraduate training. The work for dissertation can train graduate students well to engage in scientific research, to work independently, to cultivate the ability to analysis, synthesis, identify problems and problem-solving skills, and to develop a pragmatic style of work and a rigorous and practical attitude toward research.

1. Topic Selection

Graduate research project is selected under the guidance of instructor. The topics selected should be considered the forefront of this interdisciplinary research and practical operability. On the other hand, it should strive for national or provincial fund and other research projects.

2. Open Topic

Dissertation work should begin as soon as possible under the instructor to do a good job opening report on the basis of literature research. Opening report include the meaning of the legislation title, preliminary literature review, research plan and objectives, the main theoretical (technical) problems and proposed solutions. The opening report should be within the range of disciplines, public lectures, and extensive solicitation of opinions.

3. Dissertation Writing

The dissertation must be finished independently by the student himself under the guidance of the instructor. The papers have a certain amount of work in the thesis topic is to determine the time for the thesis work is generally less than one year. Paper information is reliable; the theory is correct, clear thinking, an understanding of the latest achievements of research expertise and direction, new insights on the research topic, and new research in the direction of the study. Thesis writing must conform to
the Beijing Technology and Business University graduate degree thesis format requirements. Beijing, the school two outstanding master's degree thesis, focus on improving the quality of dissertation.

4. Thesis and the degree to apply

Graduate thesis review, thesis, degree application will carry out according to the relevant provisions of the implementation of the Beijing Technology and Business University. Actively implement the "double blind" of the dissertation submitted for review, and elimination of the public defense system.

八、Degree-granting

Master of Science

九、Training schedule

Attached.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Total Hours</th>
<th>Type</th>
<th>College of Computer and Information Engineering</th>
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<tbody>
<tr>
<td>Y140401</td>
<td>Linear system theory</td>
<td>3</td>
<td>54</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Y140402</td>
<td>System identification</td>
<td>2</td>
<td>36</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Essential elective courses</td>
<td></td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y140403</td>
<td>Artificial neural network</td>
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<td>36</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Y140404</td>
<td>Optimal control</td>
<td>2</td>
<td>36</td>
<td>2</td>
<td></td>
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<tr>
<td>Y140405</td>
<td>Intelligent control</td>
<td>2</td>
<td>36</td>
<td>8</td>
<td>2</td>
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<tr>
<td>Y140406</td>
<td>DSP technology</td>
<td>2</td>
<td>36</td>
<td>2</td>
<td></td>
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<tr>
<td></td>
<td>Essential elective courses</td>
<td></td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y140310</td>
<td>Digital image processing</td>
<td>2</td>
<td>36</td>
<td>8</td>
<td>2</td>
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<tr>
<td>Y140409</td>
<td>Application and theory of chaos</td>
<td>2</td>
<td>36</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Y140410</td>
<td>Embedded system</td>
<td>2</td>
<td>36</td>
<td>1</td>
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</tbody>
</table>

**Specialty main course**

- Essential elective courses: 9
- Total credits: 36

**Degree elective course**

- Specialized optional courses
- Y140310: Digital image processing
- Y140409: Application and theory of chaos
- Y140410: Embedded system
- Total credits: 36

**Notes:**
- Two selected from four courses.
<table>
<thead>
<tr>
<th>Course ID</th>
<th>Course Title</th>
<th>Credits</th>
<th>Hours</th>
<th>Year Level</th>
<th>Department</th>
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<tbody>
<tr>
<td>Y140411</td>
<td>Logistics control engineering</td>
<td>2</td>
<td>36</td>
<td>3</td>
<td>College of Computer and Information Engineering</td>
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<tr>
<td></td>
<td>One basic course over first level discipline</td>
<td>2~3</td>
<td>36~54</td>
<td>3</td>
<td>Compulsory elective courses</td>
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<tr>
<td>Y140407</td>
<td>Modern detection theory and technology</td>
<td>2</td>
<td>36</td>
<td>2</td>
<td>College of Computer and Information Engineering</td>
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<tr>
<td></td>
<td>Essential elective courses</td>
<td></td>
<td>8~9</td>
<td></td>
<td>Compulsory elective courses</td>
</tr>
</tbody>
</table>

**Compulsory links**
- Academic lectures: 1 credit, 1~4 semesters
- Teaching practice, Social practice: 1 credit, 1~4 semesters

**Medium term examination**
- 3 credits

**Dissertation**
- Subject-selecting on Graduation Thesis: End of 3rd semester
- Medium-term inspection: beginning of 5th semester
- Concealed Evaluation, repetition rate detection of paper characters, reply: beginning of 6th semester

**Supplemental elective course**
- Automatic Control Theory
- Computer Control System
- Process Control System