

# **International Master Program of Control Science and Engineering**

**Confer a degree category: Master of Engineering**

**Program Code and Name of the First Level Discipline:**

**0811 Control Science and Engineering**

**Program Code and Name of the Second Level Discipline:**

**081101 Control Theory and Control Engineering**

**081102 Measurement Technology and Automation Device**

**081103 System Engineering**

**081104 Pattern Recognition and Intelligent System**

**081105 Navigation, Guidance and Control**

**Coding Unit: School of Automation**

**Version: 2017**

## **1. Discipline Overview**

The students of the Control Science and Engineering discipline will be able to study control theories, methods, techniques and engineering applications. The students in this discipline are required to understand the theories, models, methods and techniques on detection, modeling, control and optimization, applications, and etc. The combination of the contents with specific research is as greatly favors the diversity of this discipline. This discipline serves as a good base to other disciplines like Information and Communication Engineering, Computer Science and Technology, Electronic Science and Technology. Therefore, via various interdisciplinary activities with other disciplines, the research domain of this discipline is expanding continuously.

This discipline has five main research branches: Control Theory and Control Engineering, Measurement Technology and Automation Device, System Engineering, Pattern Recognition and Intelligent System and Navigation, Guidance and Control. After several decades of development, this discipline in CSU has formed several research directions, including Modeling, control and optimization of complex industrial processes, Detection, analysis technology and automation device of industrial processes, Intelligent control and intelligent system, Automation system technology and equipment of industrial processes, Complex system control theory and its application and etc.

## **2. Major Research Direction**

- 1) Modeling, control and optimization of complex industrial processes
- 2) Detection, analysis technology and automation device of industrial processes
- 3) Intelligent control and intelligent system
- 4) Automation system technology and equipment of industrial processes
- 5) Complex system control theory and its application

## **3. Educational Objectives**

The aim of this discipline is to train professionals in the domain of Control Science and Engineering. The students should observe disciplines and obey laws; and have an open mind, a strong sense of dedication, innovative spirit, strong moral fiber, and good academic accomplishment. This discipline trains high-level professionals in the research areas including control science and engineering and other related fields; and equips them with a solid foundation in control science and engineering. The students will master the knowledge in a systematic manner, and be familiar with the latest trends in the research areas. They should have the ability to

solve practical engineering problems and engaged in scientific pursuit independently. Also, they will become competent in research, software development and management in the domain of control science and engineering and other relevant disciplines.

#### 4. Education System and Study Duration

According to the registration administration of Central South University for international graduate students, the minimum length and longest length of study for master students are 3 years and 5 years respectively, including 1-year course study.

#### 5. The Credit Requirements and Course Arrangement

According to the rules, the training program covers 3 years, including course study, and thesis writing. The credits should be more about 29 (including Training Courses), in which degree courses (public courses and core courses) require 15 credits. Credits obtained in each semester cannot be more than 17 credits (excluding training courses).

The *Survey of China and Communicative Chinese* are compulsory courses, which will be arranged by the International Exchange and Cooperation Office and taught in Chinese language.

#### Degree Courses for Master Students Majoring in Control Science and Engineering

Courses Category	Courses Number	Courses Name	Hours	Credit	Term	Remarks
Public Courses	1000008101	Communicative Chinese	64	3	1,2	Compulsory
	1100008102	Survey of China	32	2		
Core Courses	46081118201	Linear System Theory	32	2	2	10 credit points
	46081118202	Artificial Intelligence and Pattern Recognition	32	2	2	
	46081118203	Big Data and Machine Learning	32	2	1	
	46081118204	Modern Digital Signal processing	32	2	1	
	4608111207	Scientific Writing and Academic Regulation	32	2	1	
Professional Courses	46081118301	Multi-agent System and Its Application	32	2	2	4 credit points
	46081118302	Coordination Control Theory and Its Application	32	2	2	
Optional Courses	46081118401	Predictive Control	32	2	1	Can choose courses in other disciplines, 2 credit points
Seminar	0000000505	Academic Exchanges and Academic Report		6	2	Compulsory
Training Courses	0000000602	Thesis Proposal		1	3	Compulsory
	0000000603	Research Training		1	2	

#### 6. Academic exchanges and academic report

In the condition that master students have obtained the necessary credits for those required, optional and training courses, it is encouraged to improve the weight of research discussion and communication in the master program credits. On one hand, it is necessary to give more time to the master students and their supervisors, in order

to actively promote the interaction between the students and their supervisors. On the other hand, it is necessary for the international master student to participate high-level academic exchange activities, in order to improve those students' academic performance.

A seminar will be held each year for research discussion and cooperation between foreign graduate students and Chinese graduate students. Each foreign graduate student must submit a full paper to the seminar for getting a certain credit, which is a summary of the research work done. The seminar is open to all the graduate students of the whole departments. Several advisors will be invited to attend the seminar for giving direct tutoring.

For the “academic exchanges and academic report” training course, the specific requirements are as follows.

(1) 3 credits will be given to the “project study”, which will be held in the first year. No more than three students can be grouped to do a project, which will be evaluated three times during the whole process. Initially, a project proposal report needs to be submitted. In the mid-term, a report on technical scheme needs to be submitted. Finally, a summary report needs to be reported, and an oral defense is also required. In each of the above three steps, the advisors' supervision is required. The credits will not be given without the advisor's prove.

(2) 1 or 2 credit will be given to those master students, who attend academic reports 10 or 20 times, respectively.

(3) Each master student must submit a paper to the Academic Annual Conference organized by School of Automation. The accepted papers will be counted as 1 credit. 1 credit will be given to those master students, who make an academic presentation in the Academic Annual Conference of our school.

(4) 3 credits will be given to those master students, who attend an academic conference recognized by CCF as class A, B, or C. 1 credit will be given to those master students, who attend other domestic or international conference.

(5) 1 credit will be given to those master students, who attend summer school, organized by domestic or international universities, and obtain course certificate or other verified documents.

## **7. Thesis Proposal**

During the first year, master students under the guidance of their supervisors should identify the direction of thesis research. More than 60 literatures should be reviewed for the thesis topics and each student should write the public report on the direction of thesis research which should have certain academic significance or application value, or have some practical merit on the national economy, education, cultural and social development. The reports on thesis topics are held openly with faculties. The student should fill “*the thesis proposal towards Master's Thesis at Central South University*” in the “*Graduate Education Management Information System*” online. If the report has been adopted, the Graduate School of Management Office will keep it on file. If not, the student should redo it within the next 6 months.

## **8. Research Training**

Research Training is a required course for master students. Each master student should participate in at least one research project. The purpose of this training is to enforce international master students to obtain the right research method, develop their capability to conduct research or special technique. The credit will be given to students once their supervisors approve that they have met the requirement.

## **9. Progress and Assessment of Thesis**

The school reviews the progress of thesis, phased results of the thesis, the problems in the thesis, and the gap between the thesis and the expectation. The examination will be carried out in the early October each year. If the student cannot pass the examination, sanctions will be imposed on the student according to the rules.

## **10. Regulations for Master of Degree**

### **1) Requirements on Academic Papers**

One of the following requirements on academic achievement must be met as a pre-condition for thesis defense.

- (1) publish (or accept) a paper in a journal indexed by SCI, EI, or CSCD recognized by School of Automation, CSU;
- (2) publish (or accept) an international academic conference or the domestic level of the institute (including its subordinate special committee) academic papers published at the annual conference;
- (3) An authorized patent or a patent application that has been accepted;
- (4) An excellent paper recognized by the academic annual conference for CSU graduate students.

### **2) Thesis**

The shortest working hours on the master's thesis shall not be less than 12 months. Thesis should be completed independently under the guidance of the supervisor, and in accordance with the school format. Thesis should demonstrate that the student has achieved the requirements of training objectives.

### **3) Thesis Review, Defense and Degree-granting**

Acting on "Degree-granting rules of Central South University", "Rules of dissertation defense of Central South University", "Rules of dissertation review of Central South University".