

Educational Plan for Doctor Degree Program of Structural Engineering

(081402)

Brief Introduction to the Subject

Structural Engineering is a subordinate discipline in civil engineering. It plays an important role in the urban construction, national economic and social development. Structural Engineering has the longest history in Tongji University and is one of the most important subjects, in that it educates outstanding engineers and has scientific research achievements which have considerable influence on academic and engineering fields. Structural Engineering discipline at Tongji University was founded in 1914, then grew due to the adjustment of college and departments in 1952, and accelerated its development after the merger of Shanghai Institute of Urban Construction and Shanghai Institute of Building Materials in 1996, as well as Shanghai Railway University in 2000. In 1981, Structural Engineering was granted as the first group of institute offering master and doctor degrees and also as the first batch offering position of post-doctor in civil engineering. Structural Engineering discipline was ranked as state leading academic discipline in China Discipline Assessment of 1987, 2006 and Shanghai leading discipline in 2001. Structural Engineering discipline has distinct characteristic and strong educational and research ability in concrete structures/masonry structures, steel structures/timber structures, space structures, structural analysis, disaster reduction of structural and lifeline engineering, as well as structural life-time design and maintenance. The academic discipline now has 167 faculty members, including 1 academician, 4 MOE Chang-jiang Scholar Award professors, 39 professors, 61 associate professors, 3 senior engineers, and 5 senior technicians. Most of them are extraordinary famous international experts and scholars. They lead the development of structural engineering in this country. Recently, a globally-acknowledged achievement has been attained in aspects of training of engineers, educational improvement, international collaboration, scientific research, and social service. The academic discipline has enrolled averagely 200 master graduate students, and 50 doctoral graduate students every year. Numerous educational improvement projects have been finished. Great numbers of advanced textbooks have been published. Team-work with many universities in Europe, USA, Canada, Australia, Japan, and Korea, etc. have been established. Many international activities, such as exchange of teachers and students, academic companionship, and research collaboration, etc. have been organized. A lot of state-level research projects, such as the National Climbing Plan B, the 863 Plan, the key plans of National Natural Science Foundation, Outstanding Young-Expert Program, and many other scientific researches sponsored by Ministry of Science and Technology, Ministry of Education and Shanghai Municipal People's Government, have been completed. In addition, the Structural Engineering discipline has achieved many national and local government awards and intellectual monopoly right. More than 20 national and Shanghai standards and codes of building structural design, construction, test, and appraisal have been authorized. Many software of computer aided engineering with independent monopoly right have been developed. Because of the international reputation and national leading position of Structural Engineering discipline, a couple of academic organizations and journals have been based in the academic discipline. A degree of doctor can be conferred in Structural Engineering discipline.

I. Educational Goal

a. To understand the fundamental principle of Marcs Gospel, Chairman Mao's thoughts, and Xiao-Ping Deng's ideas; to be patriotic; to obey the law; to develop appropriate views on world, life, and value; to reflect selfless dedication and enthusiastic national spirit; to combine capability, knowledge, and personality; to serve for modernization of socialism.

b. To have practical, realistic, and scientific attitude, and to generate proper, meticulous, and honest academic atmosphere; to connect theory with practice; to be good at intensive and creative study, and team work spirit.

c. To thoroughly learn fundamental theories, systematic professional knowledge and techniques of structural engineering; to be able to fluently speak the second language for scientific and academic communication; to have strong skills of computers.

d. To have a good overview on current situation and future trend of the subject and the frontiers of relevant research fields; to have capability to conduct independent and creative researches, and effectively solve engineering practical problems.

II. Research Orientations

- a. Concrete structures and masonry structures.
- b. Steel structures and timber structures.
- c. Space structures.
- d. Structural analysis.
- e. Disaster reduction of structural and lifeline engineering.
- f. Structural life-time design and maintenance.

III. Educational System and Duration

The doctoral program of Structure Engineering is a three-year program, including 1 to 1.5 years for course work. The program can be elongated up to 5 years upon an approval. One is allowed for defense, graduation, and application of the degree ahead of time, if he/she fulfills the plan ahead of time with a qualified dissertation.

IV. Credit and Curriculum

A doctoral student must take at least 14 credits of courses, including 4 credits of common academic courses, at least 5 credits of professional academic courses, at least 2 credits of non-professional courses, and 3 credits of compulsory courses.

(1) The doctoral courses are classified as academic courses, non-academic courses, and remedial courses.

(2) Academic courses are classified as professional academic and general academic courses. General academic courses include politic, foreign language, etc. Professional courses are elective courses with union lecture and examination. The methods of teaching are decided by the instructors. Different chapters of a course can be taught by several instructors. The professional course titled “Research frontiers and development trends of structural engineering” is taught by professors from different fields.

(3) Non-academic courses are elective, involving the second foreign language and professional courses. The second foreign language is set up in College of Foreign Language in Tongji University. For a student, if the first foreign language is not English, English is required as the second foreign language. Content and examination of non-academic courses are arranged for students by their advisors individually.

(4) One can apply for eliminations of professional academic courses and non-academic courses upon approval by his/her advisors/instructors and by Graduate School.

(5) Professional academic courses and non-academic courses must be taught by full professor, associate professors or outstanding assistant professors with a doctoral degree.

(6) Required trainings involve seminar, preliminary examination, and defense, each of which is recognized as one credit.

(7) Remedial courses are required fundamental courses leading to the degree in the major, involving remedial undergraduate and graduate courses. Credits of remedial courses can not be counted as required credits leading to the degree. These courses need to be completed in a year with qualified examination by students who have changed the major or have never taken required undergraduate or graduate courses in this major. According to advisors’ arrangement, a doctoral student can make up some elective master courses. Students applying for the undergraduate remedial courses take the courses with undergraduate students in College of Civil Engineering.

Students applying for the master remedial courses take the courses with master students in College of Civil Engineering.

Course Type	Course Code	Course Name	Hours	Credits	Season	
					Autumn	Spring
Common courses	1070001	Revolution in Modern Science and Technology and Marxism	54	2	√	√
	1070002	First Foreign Language (Chinese)	144	3	√	√
	1090054	First Foreign Language (English)	72	2	√	√
	1090055	First Foreign Language (German)	72	2	√	√
	1090056	First Foreign Language (Japanese)	72	2	√	√
	1900006	The conspectus of China	54	3		√
Degree courses	1020207	Complex high-rises building structural analysis and design theory	36	2	√	
	1020238	Random vibration theory	36	2	√	√
	1020271	Research frontiers and development trends of structural engineering	18	1	√	
	1020272	Engineering disaster resistant theory	36	2	√	
	1020279	Non-linear finite element method	36	2	√	
Non-degree courses	1020208	Numerical Analysis for Engineering Structures	36	2	√	√
	1020273	Theory and practice of concrete structure	36	2	√	√
	1020274	Theory and practice of bricklaying structure	36	2	√	√
	1020275	Theory and practice of steel structure	36	2	√	√
	1020276	Theory and practice of wood structure	36	2	√	√
	1020277	Theory and practice of structural analysis	36	2	√	√
	1020278	Theory and practice of structural and lifeline engineering, and resistance and control of earthquake and disaster	36	2	√	√
	1020280	Theory and practice of structural lifetime design and maintenance	36	2	√	√
	1090002	Second Foreign Language (English)	108	2	√	√
	1090006	Second Foreign Language (German)	108	2	√	√
1090007	Second Foreign Language (Japanese)	108	2	√	√	
Compulsory courses	1220016	Report on Periodical Result of Dissertation	0	1	√	√
	1890001	Lecture for Students of All Disciplines	0	1	√	√
	1900001	Dissertation Theme Selection	0	1	√	√
Complementary courses	2020046	Mechanics of Plates and shells	36	2		√
	2020054	Lectures on Engineering Reliability	36	2	√	

2020061	Dynamics of Structures (A)	54	3		√
2020064	Structural Optimization and Programming	36	2		√
2020068	Stochastic Structures of Analysis and Modelling	36	2		√
2020153	Advanced concrete structure theory	54	3		√
2020202	Durability of Concrete Structures	18	1	√	
2020206	Introduction to Selection of Structural System in Building Design	18	1	√	
2020207	Wind Engineering for Structures	36	2		√
2020208	Numerical Analysis of Structures	36	2		√
2020210	Stability Theory of Structural	36	2		√
2020219	Curtain Wall Structures	18	1	√	
2020235	Fundamentals of Damage Mechanics	36	2	√	
2020236	Cable and Membrane Structures	18	1	√	
2020241	Modern Prestressed Structures	18	1		√
2020325	Dynamics of Structures (B)	36	2	√	
2020327	Earthquake engineering	36	2		√
2020376	Advanced structural testing	36	2		√
2020377	Nonlinear analysis for concrete structure	36	2	√	
2020378	High-rise building	36	2	√	√
2020385	Reticulated Shell Structures	18	1	√	
2020387	Steel and Concrete Composite Construction	36	2		√
2020388	Advanced Theory of Steel Structures	36	2	√	
2020400	Tall structure	18	1	√	
2020418	Elasticity and Plasticity	54	3	√	
2020447	Variational Principle in Solid Mechanics	36	2		√
2020448	Fluid Mechanics	36	2		√
2020449	Fundamentals of solid modeling methods for structural engineering	36	2	√	
2020450	Fundamental of symbolic and numerical methods for structural engineering	36	2	√	
2020451	Finite Element Method	36	2	√	
2020452	Finite Element Method (bilingual)	36	2		√
2020453	Design of Thin-walled Steel Structures	18	1	√	
2020454	Steel pipe structure	18	1	√	
2020455	Elasticity and Plasticity (bilingual)	54	3	√	
2020461	Advanced concrete structural theory	54	3	√	

		(bilingual)				
	3020002	Concrete Structure Basic Principle	68	0	√	
	3020003	Steel Structure Basic Principle	51	0		√
	3020015	Structural Mechanics (I , II)	102	0	√	√
	3020017	Engineering Mechanics	68	0		√
	3020018	Construction in Civil Engineering	43	0		√

V. Compulsories

Required trainings involve seminar, preliminary examination, and defense, each of which is recognized as one credit. One shall attend at least 4 general seminars and at least 4 professional seminars. General seminars are set up by Graduate School. Professional seminars are given by professors in the department or visiting scholars off campus.

VI. Dissertation

a. Preliminary examination of a doctoral student should be executed according to the regulation of education of doctoral students in Tongji University. A public preliminary presentation followed with questions and evaluation is required in front of an evaluation committee with no less than 3 members including the student's advisor and at least two master advisors or above of other research groups. In general, the number of reviewed literatures should be more than 60, including 40 Chinese papers and 20 foreign papers. After the defense of Ph.D. dissertation has been completed, the reviewed literatures must be more than 100 papers, including 60 Chinese papers and 40 foreign papers.

b. The advisor should call for academic meetings periodically to encourage the student' communication about researches. During dissertation development, the student must deliver at least two academic lectures to report the achievement.

c. The student should finish the dissertation independently and creatively based on the advisor's instruction. The dissertation should demonstrate that the educational objectives have been completely achieved.

d. A dissertation should be written in Chinese generally. International students can write it in English or other language approved by committee members and Graduate School with detail abstract in Chinese.

e. The dissertation must be evaluated confidentially. The evaluation is executed by Graduate School.

f. For students who submit a Chinese dissertation, an English paper qualified for an international journal or with equivalent quality is required in addition to a detailed English abstract of the dissertation.

g. The student can be allowed for defense of dissertation upon approval by the academic degree committee if he/she has achieved educational objectives without fulfilling requirements of paper publication. The student can be allowed to graduate if he/she has passed the defense. The diploma of the degree will be issued to the student only after requirements of paper publication is fulfilled.

h. Confidentiality and management of a dissertation of an academic degree are executed according to the temporary regulation of confidentiality and management of a dissertation of a graduate student in Tongji University.

VII. Research Papers

A doctoral student should publish an academic paper of high quality. An applicant for a doctoral degree needs to achieve one of two following requirements:

(1) One academic paper is published or accepted in an international journal (SCI, EI). Recommended journals are listed in the list of international journals at College of Civil Engineering.

(2) Two papers are published in a key national academic journal, including at least one indexed in SCI database or EI database. Additionally one paper is submitted to an international conference.

VIII. Other remarks

Requirement on education of a doctoral candidate not stated here should refer to relevant regulations at Graduate School in Tongji University.