

## **Annex 1 to SPECIFIC COOPERATION AGREEMENT OF THE DOUBLE MASTER DEGREE PROGRAM BETWEEN TU DARMSTADT AND TONGJI UNIVERSITY**

# **Study program of the Double Master Tongji-TU Darmstadt in Materials Science and Engineering**

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The annex relates to the SPECIFIC COOPERATION AGREEMENT OF THE DOUBLE MASTER DEGREE PROGRAM BETWEEN TU DARMSTADT AND TONGJI UNIVERSITY and has to be revised at every coordinators meeting. Changes at that meeting or in between have to be in writing and signed by the coordinators of both parties concerned.

### **Course aims**

The Double Master Tongji-TU Darmstadt in Materials Science and Engineering is research-based and builds on the competencies and skills acquired throughout a Bachelor degree course in Materials Science and Engineering (Tongji) or Materials Science (TUDa). B.Sc. graduates possess demonstrable study skills, basic grounding in both mathematics and sciences as well as a sound knowledge of the fundamentals of materials science, as taught during the B.Sc. degree course at both institutions. This M.Sc. program aims to enrich skills in materials science and qualify students to pursue a scientific career in all relevant fields.

Objectives of the M.Sc. degree program:

- Develop the ability to study the subject in a broader context and establish an association between newly acquired knowledge and prior knowledge.
- Encourage students to adopt a creative approach to developing materials, products, processes or methods in an entirely new design or context.
- Train students to independently solve practical problems by applying research-based or scientific methods.
- Foster the ability and sovereignty to scrutinize assertions related to materials science and to confidently argue one's own standpoint in front of professional peers and non-professionals.
- Foster the aptitude to present a written or oral account of scientific results in an accurate and coherent manner.
- Develop the skill to structure complex problems taking into account criteria relevant to materials science, materials engineering and ecology. This also includes economic issues specific to materials, e.g. manufacturing costs subject to the availability of raw materials and technology.
- Foster the ability to work with other disciplines, i.e. to tackle problems posed by other disciplines while recognizing which scientific approach to adopt in order to solve the problem. This particularly applies to the inextricably interwoven nature of materials science and materials engineering.

- Pinpoint the social challenges and social consequences of a materials scientist's work while encouraging students to adopt a responsible attitude.
- Develop the capacity to set realistic yet demanding goals attainable within a reasonable time frame and involving reflection upon both the results and the respective approach.
- Develop intercultural competencies alongside the improved proficiency of the foreign language acquired abroad.

### **Study program general structure**

The study program generally follows the structures of the materials science and engineering and the materials science programs of both universities. The scientific study program is completely taught in English.

At Tongji University, the students shall study according to the program "Master of Engineering". The description of the study plan will be explained in the study module guide in 2023. The overseas students are required to take two courses including overview of China and Chinese. Teaching units at the partner university replace teaching units at the home university as indicated in the lists of teaching units below. The students will have to finish at least 1/2 credits required by Tongji University (for example, 30 credits for the master of engineering in Materials Science and Engineering and 34 credits for Master of Engineering in Material Engineering). The students from TUDa should have basic knowledge of China and obey the policy of Graduates Students Handbook in Tongji University and other policies in China.

At TU Darmstadt (TUDa), the students shall study according to the program "Materials Science with Degree Master of Science". The full description of the teaching units is defined in the module guide of the materials science program. The General Examination Regulations of TU Darmstadt (Allgemeine Prüfungsbestimmungen) apply. Unless otherwise specified in the Specific Cooperation Agreement, course structure, exams and grading follow the rules of the Implementation Regulations (Ausführungsbestimmungen) and the Study regulations of the study program Materials Science. Admission follows §1 Candidates' selection of the specific agreement. To be accepted for the program TUDa regulations ask for knowledge of the English language at least on a CEFR C1 level. Tongji students are exempt from the admission requirement of an industrial or research placement at TU Darmstadt. Teaching units at the partner university replace teaching units at the home university as indicated in the lists of teaching units below. TUDa students can replace up to 6 CP (graded) in the area Elective Courses in Materials Science with Chinese language courses (Elective Courses not Materials Science). Tongji students can replace up to 6 CP in the area Elective Courses in Materials Science with German language courses (graded).

## List of teaching units for Tongji students

The following study program details the course structure for Tongji students. The teaching units that have to be taken are indicated. The list also details the corresponding teaching unit/subject area at the other university. The corresponding Tongji and TU credits are also indicated where applicable.

The names of the teaching units refer to the names of the teaching units at the respective universities as defined in the respective module guides.

CP: Credit point TU Darmstadt

TC: Tongji credit point

### Semester 1 (at Tongji)

<i>Numerical Analysis, Tongji compulsory (replaces Micromechanics of Materials Science, TUDa compulsory)</i>	6CP / 3 TC
<i>Materials Preparation Technology and Experiments, Tongji compulsory (replaces Research Lab I, TUDa compulsory)</i>	4CP / 2 TC
<i>Surface Chemistry and Physics of Materials (replaces Surfaces and Interfaces, TUDa compulsory)</i>	5 CP / 3 TC
<i>Laboratory safety, not graded, Tongji compulsory (transferred to TUDa as Non Mat. Sci. Selective Course)</i>	2CP / 1TC

*TUDa semester credits: Total (compulsory, MS selective, Non MS selective): 17CP (15/0/2)*

*TUDa cumulative credits: Total (compulsory, MS selective, Non MS selective): 17CP (15/0/2)*

### Semester 2 (at Tongji)

<i>Modern Analytical Methods, Tongji compulsory (replaces Advanced Characterization Methods of Materials Science, TUDa compulsory)</i>	6CP / 2TC*
<i>Advanced Lectures for Graduate Students, Tongji compulsory (transferred to TUDa as Mat. Sci. Selective Course if it is graded.)</i>	4CP / 2TC
<i>Thesis proposal, Tongji compulsory (transferred to TUDa as Mat. Sci. Selective Course if it is graded.)</i>	2CP / 1TC
<i>Writing of Scientific Literature, Tongji compulsory (transferred to TUDa as Mat. Sci. Selective Course)</i>	4CP / 2TC
<i>Research writing and ethical norm, graded, Tongji compulsory (transferred to TUDa as Non Mat. Sci. Selective Course)</i>	4CP / 2TC
<i>Interim-Assessment, not graded, Tongji compulsory</i>	0TC

*TUDa semester credits: Total (compulsory, MS selective, Non MS selective): 20CP (6/10/4)*

*TUDa cumulative credits: Total (compulsory, MS selective, Non MS selective): 37CP (21/10/6)*

### Semester 3 (at TUDa)

<i>Functional Materials, TUDa compulsory (replaces Tongji selective course Inorganic Functional Materials)</i>	6CP / 3TC
<i>Sustainable Materials, TUDa compulsory (transferred to Tongji as Mat. Sci. Selective Course)</i>	6CP / 3TC
<i>Mat. Sci. Selective Courses of Choice (transferred to Tongji as Mat. Sci. Selective Course)</i>	8CP / 4TC
<i>German Courses, Non Mat. Sci. TUDa (transferred to Tongji as Non Mat. Sci. Selective Course)</i>	4CP / 2TC

*TUDa semester credits: Total (compulsory, MS selective, Non MS selective): 24CP (12/8/4)*

*TUDa cumulative credits: Total (compulsory, MS selective, Non MS selective): 61CP (33/18/10)*

*Semester 4 (at TUDa)*

<i>Theoretical Materials Science, TUDa compulsory (replaces Thermodynamics of Materials)</i>	<i>6CP / 3TC</i>
<i>Research Lab II, TUDa compulsory (transferred to Tongji as Mat. Sci. Selective Course)</i>	<i>4CP / 2TC</i>
<i>Advanced Research Lab with Seminar, TUDa compulsory (transferred to Tongji as Mat. Sci. Selective Course)</i>	<i>15CP / 7,5TC</i>
<i>Mat. Sci. Selective Courses of Choice (transferred to Tongji as Mat. Sci. Selective Course)</i>	<i>4CP / 2TC</i>

*TUDa semester credits: Total (compulsory, MS selective, Non MS selective): 29CP (25/4/0)*

*TUDa cumulative credits: Total (compulsory, MS selective, Non MS selective): 90CP (58/22/10)*

*Semester 5 (at Tongji)*

<i>Master Thesis, graded, Tongji compulsory (replaces Master Thesis TUDa compulsory)</i>	<i>30CP / 15TC</i>
<i>Schedule of the Master Thesis</i>	
<i>The Topic is defined in early semester 3 in cooperation between a professor from Tongji and TUDa. A kick-off seminar takes place in semester 3. The mid-term defense is scheduled at semester 4. The thesis shall be defended (both supervisors, teleconference possible) after the theses has been submitted to Tongji. At least one research paper has to be published max. 21 months after the defense</i>	

*TUDa semester credits: Total (compulsory, MS selective, Non MS selective): 30CP (30/0/0)*

*TUDa cumulative credits: Total (compulsory, MS selective, Non MS selective): 120CP (88/22/10)*

*\* The content of the two modules (Modern Analytical Methods, Tongji compulsory, 2TC and Advanced Characterization Methods of Materials Science, 6CP, TUDa compulsory) match very well with each other. But credit points are different, particularly due to the exercise hours, thereby 2CP less. But on the other hand, Surface chemistry of materials 3TC at Tongji are transferred to TUDa only as 5CP. To avoid the overload, the study office suggests to transfer the Modern Analytical Methods 2TC to Advanced Characterization Methods of Materials Science, 6CP.*

## List of teaching units for TUDa students

The following study program details the course structure for TUDa students. The teaching units that have to be taken are indicated. The list also details the corresponding teaching unit/subject area at the other university. The corresponding Tongji Credits and CP are also indicated where applicable.

The names of the teaching units refer to the names of the teaching units at the respective universities as defined in the respective module guides.

### Semester 1 (at TUDa)

<i>Surfaces and Interfaces, TUDa compulsory (replaces Tongji as Mat. Sci. Selective Course)</i>	5 CP / 3 TC
<i>Functional Materials, TUDa compulsory (replaces Tongji as Mat. Sci. Selective Course)</i>	6CP / 3TC
<i>Sustainable Materials, TUDa compulsory (transferred to Tongji as Mat. Sci. Selective Course)</i>	6CP / 3TC
<i>Mat. Sci. Selective course of choice</i>	6CP / 3TC

*TUDa semester credits: Total (compulsory, MS selective, Non MS selective): 23CP (17/6/0)*

*TUDa cumulative credits: Total (compulsory, MS selective, Non MS selective): 23CP (17/6/0)*

### Semester 2 (at TUDa)

<i>Theoretical Materials Science, TUDa compulsory (transferred to Tongji as Mat. Sci. selective course)</i>	6CP / 3TC
<i>Research Lab II, TUDa compulsory (transferred to Tongji as Mat. Sci. Selective Course)</i>	4CP / 2TC
<i>Mat. Sci. Selective course of choice</i>	6CP / 3TC

*TUDa semester credits: Total (compulsory, MS selective, Non MS selective): 16CP (10/6/0)*

*TUDa cumulative credits: Total (compulsory, MS selective, Non MS selective): 39CP (27/12/0)*

### Semester 3 (at Tongji)

<i>Numerical Analysis, Tongji compulsory (replaces Micromechanics of Materials Science, TUDa compulsory), graded</i>	6CP / 3 TC
<i>Materials Preparation Technology and Experiments, Tongji compulsory (replaces Research Lab I, TUDa compulsory)</i>	4CP / 2 TC
<i>Writing of Scientific Literature, Tongji compulsory (transferred to TUDa as Mat. Sci. Selective Course)</i>	4CP / 2TC
<i>Research writing and ethical norm, Tongji compulsory (transferred to TUDa as Non Mat. Sci. Selective Course)</i>	4CP / 2TC
<i>Laboratory safety, not graded, Tongji compulsory (transferred to TUDa as Non Mat. Sci. Selective Course)</i>	2CP / 1TC
<i>Interim-Assessment, not graded, Tongji compulsory</i>	0CP / 0TC
<i>Chinese language course (transferred to TUDa as Non Mat. Sci. Selective course)</i>	5CP / 2,5 TC
<i>A General View of China (transferred to TUDa as Non Mat. Sci. Selective course)</i>	6CP/3TC

*TUDa semester credits: Total (compulsory, MS selective, Non MS selective): 25CP (10/4/17)*

*TUDa cumulative credits: Total (compulsory, MS selective, Non MS selective): 64CP (37/16/17)*

*Semester 4 (at Tongji)*

<i>Advanced Research Lab with Seminar (transferred to TUDa compulsory as it is)</i>	<i>15CP</i>
<i>Modern Analytical Methods for Materials, Tongji compulsory (replaces Advanced Characterization Methods of Materials Science, TUDa compulsory)</i>	<i>6CP / 2TC**</i>
<i>Advanced Lectures for Graduate Students, Tongji compulsory (transferred to TUDa as Mat. Sci. Selective Course if it is graded. If not, alternative selective course should be added)</i>	<i>4CP / 2TC</i>
<i>Thesis proposal, Tongji compulsory (transferred to TUDa as Mat. Sci. Selective Course if it is graded.)</i>	<i>2CP / 1TC</i>

*TUDa semester credits: Total (compulsory, MS selective, Non MS selective): 27P (21/6/0)*

*TUDa cumulative credits: Total (compulsory, MS selective, Non MS selective): 91CP (58/22/17)*

*Semester 5 (at TUDa)*

<i>Master Thesis TUDa compulsory (replaces Master Thesis Tongji compulsory)</i>	<i>30CP / 15TC</i>
<i>Schedule of the Master Thesis</i>	
<i>The Topic is defined in early semester 3 in cooperation between a professor from Tongji and TUDa. A kick-off seminar takes place in semester 3. The mid-term defense is scheduled at semester 4. The thesis shall be defended (both supervisors, teleconference possible) after the theses has been submitted to Tongji.</i>	

*TUDa semester credits: Total (compulsory, MS selective, Non MS selective): 30CP (30/0/0)*

*TUDa cumulative credits: Total (compulsory, MS selective, Non MS selective): 127CP*

*\*\* , Similarly, the content of the two modules (Modern Analytical Methods, Tongji compulsory, 2TC and Advanced Characterization Methods of Materials Science, 6CP, TUDa compulsory) match very well with each other. But credit points are different, particularly due to the exercise hours, thereby 2CP less. But on the other hand, Surface chemistry of materials 3TC at Tongji are transferred to TUDa only as 5CP. To avoid the overload, the study office suggests to transfer the Modern Analytical Methods 2TC to Advanced Characterization Methods of Materials Science, 6CP.*

## **Coordinators Signatures**

### **TU Darmstadt**

Prof. Dr. Jan Philipp Hofmann

Date:

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### **Tongji University**

Prof. Dr. Zhengwu Jiang

Date:

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