Degree Agreement between Justus Liebig University Giessen, and its Faculty of Mathematics and Computer Science, Physics, Geography and its Faculty of Biology and Chemistry, Germany and The Graduate School of Science and Engineering, Kansai University, Japan

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1. Aims

Based on the agreement of Justus Liebig University (JLU) and Kansai University (KU) both universities establish a double degree programme on Master's level in material science. The programme provides the opportunity for master students of material science at JLU and for master students of the Graduate School of Science and Engineering at KU to gain the Master's degree of both universities: the „Master of Science" of JLU and the „Master of Engineering" (or the "Master of Science" – for KU students only) of KU.

2. Master's programmes

The double degree programme is based on the following two Master's programmes:

The **JLU Master's programme in Material Science** is commonly taught by Faculty 07 – Mathematics, Computer Science, Physics, Geography and Faculty 08 - Biology and Chemistry at the JLU. Starting every October, the 2 years long programme (i.e. 4 semesters) includes core modules in each subject, chemistry and physics, as well as optional modules in the first year (lecture-based modules). The second year is entirely devoted to research work. Students choose 3 research-oriented modules. The Masters' programme will be completed by submitting the Master's thesis and defending its results in front of an examination committee.

On successful completion of the programme, both faculties jointly confer the award of „Master of Science"(M.Sc.). Students receive a Master's certificate and a Certificate of Examination including Master's classification[1] and Transcript of Records (titles of all modules passed, workload and grading, title of Master's thesis and grading).

The Masters' programme itself is structured in modules. Modules are units of lectures, practical work, seminars, tutorials etc. dedicated to a specified topic (e.g. electrochemistry, solid state theory). Each module is described in detail by its content, aims, workload, types of exams, responsible lecturer etc. and is listed in the "Module descriptions" attached to the Special Regulation for the Master's programme in material science.

In general, there are two different types of **modules**:

- **Lecture-based modules:** These modules typically include a lecture (running for 15 weeks = 1 semester) and a seminar or a theoretical/practical exercise run by tutors. Thus, these modules can typically be finished completely within 4-5 months. Marks will be given on the basis of either a written or oral exam at the end of

[1] The M.Sc. award is classified according to an overall grading. The overall grade is calculated by dividing the total weighted grade points (grade points for each module multiplied by the credit points allocated to the module) by the total number of credit points.

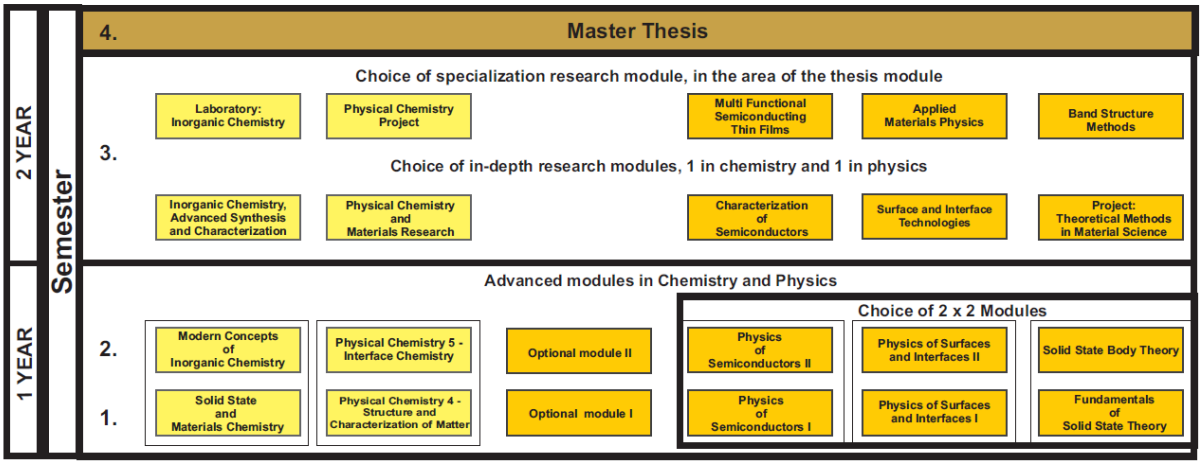
the module. The subjects of the modules typically represent important fields in science and technology, i.e. colloid chemistry, electrochemistry, photovoltaics etc. During the first year, JLU students choose 4 of these advanced modules in chemistry and 4 in physics. Additionally, they follow their own interests by choosing 2 optional lecture- and/or research-based modules (6 CP each).

- **Research modules:** These modules are exclusively research-based, and the modules are defined on an individual basis – depending on the research profile of the respective master student. The student can either take part in ongoing research or can be trained in a specific scientific method (e.g. a specific analytical method). At JLU students select three research modules during the second year: two in-depth research modules in materials science-oriented chemistry and physics, one specialisation research module for preparing their Master thesis. Additionally, they follow their own interests by choosing 2 optional lecture- and/or research-based modules (6 CP each).

In accordance with the European Credit Transfer System (ECTS), the volume of learning activities (workload) required for achieving the Master's degree in material science equals 120 ECTS Credit Points (CP), i.e. 30 CP per semester / 60 CP per year. 1 CP is equivalent to an average working time of 30 hours. This includes contact time at which students have to be present at lectures, seminars, tutorials, practical work etc. and time for preparation and post-processing. Finally, this also includes time for self-study and examinations.

Each first year lecture-based module comprises 6 CP corresponding to 180 hours working time. The second year research modules comprise 10 CP each (i.e. 300 h). Preparing and defending the Master's thesis is equivalent to 30 CP (i.e. 900 h / 22 weeks).

M.Sc. Material Science Schedule:



The **KU Masters' programme** at the Graduate School of Science and Engineering

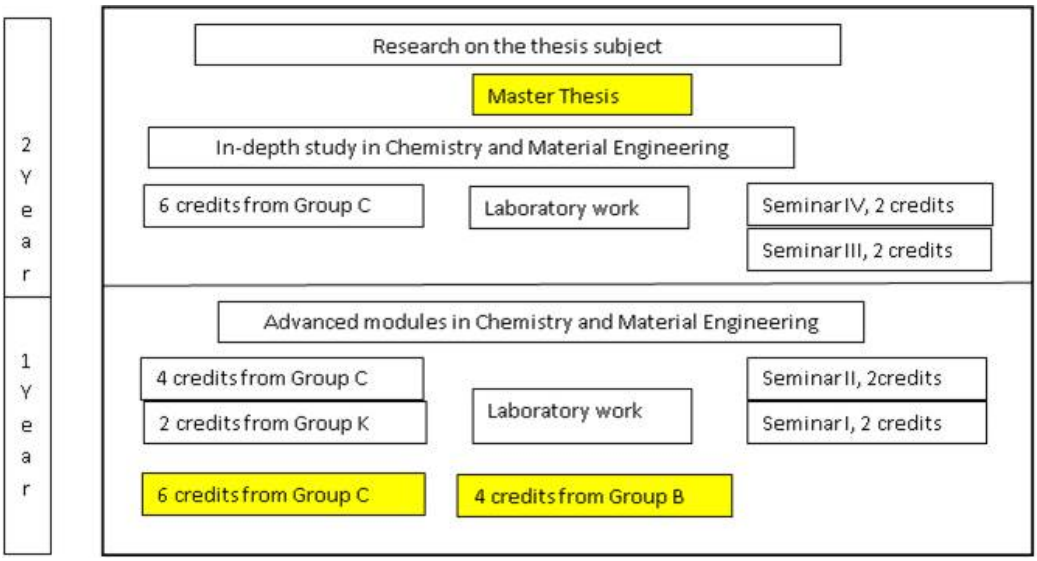
- **Lecture courses**: These courses typically run for 15 weeks. Marks will be given at the end of the course on the basis of either a written exam, a written report, or an oral exam. KU students typically takes 1 course from Group A, 2 courses from Group B and 8 courses from Group C. (2 credits each)
- **Project-based courses**: Some courses are given in the form of project-based learning. A research project is given for each student. Some introductory lectures are given and guidance will be given each week in response to the progress report of the students. Marks will be given at the end of the course on the basis of the performance. (2 credits each)
- **Seminar courses**: Seminar courses are exclusively research-based, and are defined on an individual basis. They are mainly aimed for the preparation of Master thesis. They include long-hour laboratory works but they are counted only 2 credits for each course.

Workload: 30 credits and the submission and defense of master thesis are required for achieving the Master's degree. Typically, 18 credits lecture courses, 4 credits project-based courses, and 8 credits Seminar courses are taken. The programme is designed to be completed in 2 years. As the below chart would illustrate, the courses from group A-K should be obtained mostly in the first year, whereas Master thesis and most of the in-depth study in their selected field as well as work at the laboratory should take place in the second year.

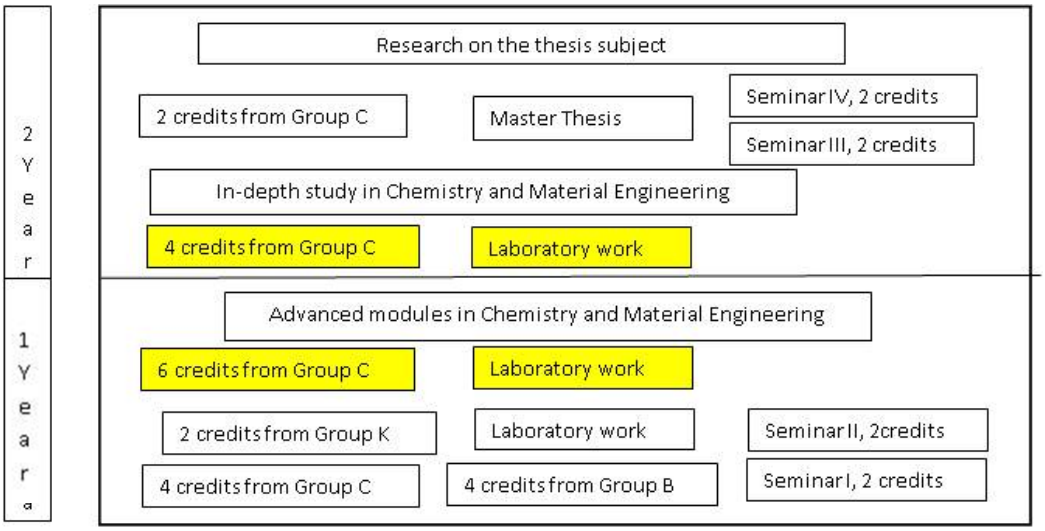
1 credit in lecture course is equivalent to the working time of 45 hours. This includes contact time at which students have to be present at lectures and time for preparation and post processing, and also it includes time for self-study and examinations.

Official workload for a Seminar course is the same as that for a lecture course. To account for the actual workload for Seminar courses, for DD students, KU will certificate the laboratory works. Marks will be given on the basis of written reports and/or oral presentations.

M. Eng Chemistry and Materials Engineering Schedule for JLU DD students:



M. Eng Chemistry and Materials Engineering Schedule for KU DD students:



Yellow boxes mean that they are to be replaced with the studies in JLU.

3. Double Degree Programme

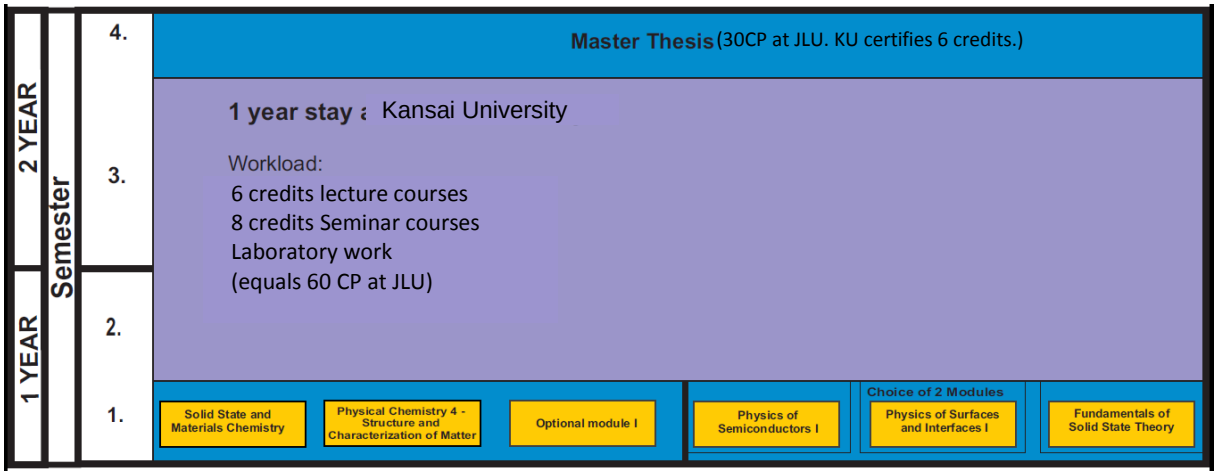
Requirements for awarding a Master's degree of JLU and of KU in the framework of the double degree programme:

- Students have to complete a one year study stay at the partner university. During this time they have to pass all modules (i.e. the course work) defined in the working plan mutually agreed upon by the academic coordinators at JLU and KU. The working plan shall contain the typical workload per year at the partner university: i.e. at JLU 60 CP in total (lecture based and research modules), at KU 8 credits lecture course and 6 credits research. Therefore, each university offers a defined set of modules (i.e. lecture courses) taught in English. These modules (i.e. lecture courses) should be fully accepted by both universities. An updated list has to be provided by both universities regularly.
- Furthermore, the master thesis has to be written under joint supervision by professors from both universities and has to be defended in front of an examination committee.

Schedule for Students' Exchange:

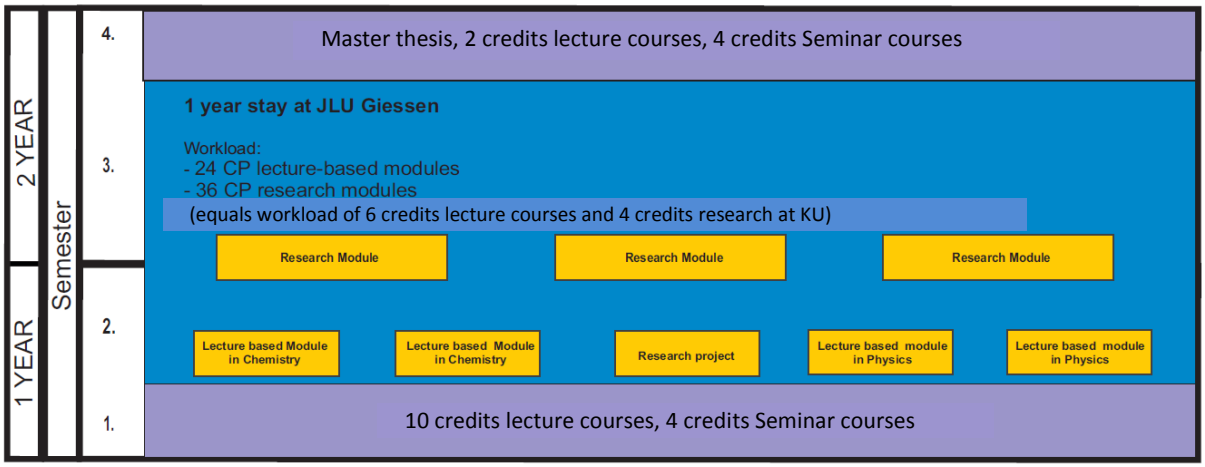
JLU students of the Masters' programme in material science start their studies in October at JLU (semester 1: October - March). During the first semester, they have to pass 5 lecture-based modules (i.e. 30 CP in total). Afterwards, from March on, they spend a one year study stay (2 semesters) at the KU Graduate School of Science and Engineering where they have to obtain 14 credits (equals 60 CP at JLU), typically, 6 credits by lecture courses and 8 credits by Seminar courses. After coming back to the JLU, students complete their studies by preparing and defending their master thesis (30 CP at JLU. KU certify 6 credits research).

<u>Schedule for JLU students:</u>



Master's students of the Graduate School of Science and Engineering start their studies in April at KU. During their first semester (from April - September) they typically obtain 10 credits by lecture courses and 4 credits by Seminar courses. From October on, they spend a one year study stay (2 semesters) at the JLU where they have to obtain 60 CP in total: Students choose 4 lecture-based modules (two in each subject, chemistry and physics) and a minor research project module (6 CP each). Furthermore, depending on their research profile students choose 3 research modules (10 CP each), in consultation with their supervisor. Back at the KU, along with 2 credits lecture courses and 4 credits Seminar courses, students complete their studies by preparing and defending their master thesis.

Schedule for KU students:



4. Master thesis

After returning to their home university, students continue their research work and finalise their master thesis. Outcomes of the students' research work at the partner university shall be included in their Master thesis. These deliverables have to be specified as being gained at the partner university. The master thesis has to be written under the joint supervision of both universities and has to be submitted in English on schedule at the students' home university. One copy of the master thesis has to be provided for each supervisor at JLU and at KU. The outcomes of the master thesis have to be defended in English in front of an examination committee. The supervisor of the partner university has to be enabled to participate in the committee (in person or via internet).

5. Application and Entry Requirements

Admission procedures to the double degree programme are carried out by the home universities. At the same time, the host university reserves the right for making the final decision.

Both universities should nominate students of their Master's programmes. A maximum number of 5 students can be proposed per year.

As the entire study stay at the partner university will be conducted in English, knowledge of written and spoken English is required. Applicants must provide a certificate giving evidence of their proficiency in English. The following are accepted as evidence:

- 80 (iBT – internet based) in the TOEFL (Test of English as a Foreign Language),
- 6 points in the IELTS Academic Test (International English Language Testing System),
- a Bachelor's degree course completed in English or
- another approved English competency test (e.g. at JLU DAAD vd2 or UNIcert II European Level B2; at KU those who have (i) at least TOEFL score of 550 ~600 PBT and (ii) obtained a very good standing grade (A or above) from the English mediated courses offered at Kansai University in prior to their departure for their study abroad at JLU [For AY 2016-2017, Academic Writing Practice, Presentation Skills, and Academic Discussion & Debates].

Master students who are admitted to the JLU Master's programme in Material Science or the KU Masters' programme at the Graduate School of Science and Engineering are eligible to apply for the double degree programme. During their first semester, applicants have to submit the following documents (in English) to the academic coordinator of their home university:

- Bachelor's Certificate,

- Letter of motivation,
- Working plan accepted by a professor and the academic coordinator of their home university,
- Letter confirming supervision by a professor of the partner university,
- an approved English competency test (see above).

Additionally, JLU students must prove that they have passed all first semester modules' exams (30 CP).

Students may also be admitted to the programme on the basis of interviews guided by the academic coordinator of their home university.

Based on the requirements and procedures mentioned above, both universities should nominate students as candidates for the programme. By the partner universities' academic coordinators' approval (including confirmation of working plan and supervision) students are admitted to the double degree programme by their home university.

6. Language

Studying during the study stay at the partner university is carried out in English. The Master thesis has to be written and defended in English.

7. Workload Approval and Grading Scheme

It is agreed that mutual recognition of the period of studies at the partner university is guaranteed. The workload will be calculated on the basis of the guidelines of the participating universities. At the JLU the basis for recognition is the Special Regulation for the programme in Material Science leading to the Master of Science degree at Justus Liebig University Giessen:

https://www.uni-giessen.de/mug/7/findex36.html/7_36_07_1_M

The KU Masters' programme at the Graduate School of Science and Engineering consists of nine "Disciplines" which exactly correspond to the nine departments in the undergraduate course: 1. Mathematics, 2. Pure and Applied Physics, 3. Mechanical Engineering, 4. Electrical and Electronic Engineering, 5. Architecture, 6. Civil, Environmental and Applied System Engineering, 7. Chemical, Energy and Environmental Engineering, 8. Chemistry and Material Engineering, 9. Life Science and Biotechnology. They are grouped into three "Majors" which again correspond to the three faculties: I. Engineering Science (1, 2, 3, 4), II. Environmental and Urban Engineering (5, 6, 7), III. Chemistry, Materials and Bioengineering (8, 9).

There are two courses for the Master degree program. One is the standard course in which the lectures are given in Japanese language, and the other is the newly opened international course in which the lectures are given in English.

In the standard course, most of the students are those from the corresponding undergraduate course, though there are also students from other universities in Japan and foreign students who are qualified in Japanese language. Since the main part of the students is from Kansai University, the curriculum of this course is designed to extend from that of the undergraduate course. In the undergraduate course, the curriculum is organized to train the students to be engineers, teachers, public officers, and so on. It starts with the basic lectures in the first year, then higher level lectures in specialized fields follow in the second and in the third year. In the final year, the students belong in the laboratories and do their research under the supervision of the professors. The total number of 128 credits is necessary to finish the undergraduate course. The students coming to the Graduate School are expected to have the knowledge which is necessary to start their thesis research. The lectures in the Graduate School are given rather independently by each professor without much correlation among the lectures.

Thus, the organization of the lectures in the master course is quite different from that in the undergraduate course.

Lectures in the standard course are grouped into three categories: Group A, Group B and Group C. Group A contains the lectures that are common to all the Disciplines, for example, “Engineering Ethics”, “Intellectual Property”, “Philosophy of Science and Technology”, and so on. They offer general knowledge to the students to be highly educated engineers and scientists. Group B contains the basic lectures that are common to a group of some Disciplines. For example, for Chemistry, Materials and Bioengineering Major (Faculty), it contains “Safety Technology”, “X-ray Diffraction”, “Polymer Science”, “Advanced Life Science”, “Advanced Biotechnology”, and so on. Group C contains the specialized lectures given by each professor.

In order to be granted a Master degree (in Engineering or in Science), it is necessary for the students to acquire 30 credits and to submit the thesis. Among the 30 credits, 2 credits must be acquired from the common subjects in Group A. It is also recommended to take some classes from Group B. Besides these general subjects, the students need to take classes on their specialized subjects. They include compulsory four “Seminar” classes in which the students make preparations for the thesis work under the supervision by the professor. Students take one Seminar class in each semester. Each Seminar class is worth only 2 credits, but it actually reflects all the laboratory works by the students. Normally, students acquire about 24 credits in the first year. That is, even in the first year, students spend a significant amount of time in the laboratory, acquiring laboratory skills and learning how to organize research projects. In the second year, they focus on the thesis work. Many of them have chances to report on their research work in academic meetings.

The newly opened International course is organized for the foreign students who are not familiar with Japanese language. In this course, the lectures are given in English and the direction and guidance on the research are also given in English. The students are requested to submit a master thesis that is written in English. The number of lectures in this course is rather limited at this moment and it will get larger in a few years. The lectures in the International course are grouped into two categories: Group K and Group C. Group K contains the lectures that are common to all the students in this course. There are lectures for the foreign students to get familiar to Japan (Japan study), such as its history and culture of Japan, company management and business in Japan and so on. Group C contains some general lectures of the field specially prepared for this course and the specialized lectures by each professor.

As in the standard course, it is necessary to acquire 30 credits to obtain a Master degree of Kansai University. Four “Seminar” classes (8 credits) are compulsory also in this course. One has to acquire at least 2 credits (or 4 credits) from Group K.

This course is applied also to the students in the DD (double degree) program. In the case of the DD program, one may utilize the credit transfer system to cover the maximum of 10 credits. The 8 credits of Seminar classes and the credits from Group K are still compulsory. That leaves about 10 credits to be acquired from Group C.

It is strongly recommended for the students in the DD program to discuss in advance with the home supervisor and with the host supervisor on what subjects should be learned in Japan.

Workload Approval:

Gaining the Master’s degree of JLU and of KU in the framework of the double degree programme requires that students pass modules (i.e. course work) to the extent of a typical one year workload at the partner university:

- at JLU 60 CP in total (lecture based and research modules),
- at KU 6 credits lecture courses, 8 credits Seminar courses.

Mutual recognition of study periods (modules/course work resp. CP/credits) is implemented on the basis of the following tables which contain a comparison of workload at JLU and KU.

Workload approval for JLU students:

	Approved as *(in italics)*	
	JLU	**KU**
1.Semester (JLU)	30 CP (5 x 6 CP modules)	*10 credits lectures*
2.+3.Semester (KU)	*24 CP (4 x 6 CP modules)*	6 credits lectures
	36 CP research modules	8 credits Seminar
4.Semester (JLU)	30 CP (Master thesis)	*Master thesis (6 credits research)*
Σ	**120 CP**	**16 credits lecture, 14 credits research**

Workload approval for KU students:

	Approved as *(in italics)*	
	KU	**JLU**
1.Semester (KU)	10 credits lectures, 4 credits Seminar + lab. work	*30 CP*
2.+3.Semester (JLU)	*6 credits lectures, 4 credits research*	24 CP (4 x 6 CP modules), 36 CP (6 CP project, 30 CP research modules)
4.Semester (KU)	2 credits lectures, 4 credits Seminar + Master thesis	*30 CP*
Σ	**18 credits lectures, 12 credits research**	**120 CP**

Comparative Grading Scheme:
All work performed within modules shall be graded in accordance with the grading scheme applicable at the universities in question.

Comparative table of JLU/KU grades:

JLU			**KU**		
Percentages for the evaluation	**Grades**	**Verbal grades**	**Percentages for the evaluation**	**Grades**	**Verbal grades**
≥ 97	15	very good with distinction	≥ 80	A	very good
≥ 92	14	very good			
≥ 87	13	very good			
≥ 82	12	Good			
≥ 77	11	Good			
≥ 73	10	Good	70 – 79	B	Good
≥ 68	9	satisfactory			
≥ 64	8	satisfactory	60 – 69	C	sufficient
≥ 59	7	satisfactory			
≥ 54	6	sufficient			
≥ 50	5	sufficient			
< 50	4-0	Fail	< 60	F	Fail

For approval of workload and grading a summary table should be provided in English for each student by the corresponding university. The summary table should also contain the title of the modules, workload and the grades (Transcript of Records). In order to arrive at the overall grade, the module grades at JLU should be converted into KU grades and vice versa in accordance with the table presented above.

8. Master's Certificate

Students who meet academic requirements (provided that no module is finally failed) in the framework of the double degree programme should be awarded two Master's Certificates: the Master's certificate of JLU „Master of Science" and the Master's certificate of KU „Master of Engineering" (or "Master of Science" for KU students only).

Both certificates must refer to the bilateral double degree programme. Students also receive a Certificate of Examination including Master's classification and a Transcript of Records. Both universities provide Diploma Supplements.

9. Academic coordination

To ensure and facilitate the implementation of the double degree programme, each institution shall appoint an academic coordinator as contact person. The coordinators can be addressed by students, JLU and KU colleagues of the double degree programme. Besides admitting applicants they are authorized persons for accepting students' working plans and workload approval.

List 1 (JLU) (year 2015/2016)

Lecture-based modules:

These modules (6 CP) are run either in the winter or summer semester. Each year KU will be provided with a list of available modules.

Course Code	**Title of course**	**Responsible Professor**	**Institute**
Chemistry-MNW03	Metal and Ligand reactivity (Chemistry of complexes)	Schindler	Inorganic Chemistry
Chemistry-MNW04	Computational chemistry/Molecular Modeling	Schreiner	Organic Chemistry
Chemistry-MNW06	Scientific Writing and Data Dissemination	Schreiner	Organic Chemistry
Chemistry-MNW07	Matrix Isolation Techniques/Reactive Intermediates	Schreiner	Organic Chemistry
Chemistry-MNW15	Colloid chemistry	Smarsly	Physical Chemistry
Chemistry-MNW16	Electrochemistry I – From Basics to Application	Janek	Physical Chemistry
Chemistry-MNW17	Electrochemistry II – Electrochemical Energy Technologies	Janek	Physical Chemistry
Chemistry-MNW18	Solid State Reactions	Janek	Physical Chemistry
Chemistry-MNW24	Surface chemistry and metal catalysis	Over	Physical Chemistry
Chemistry-MNW25	Electrochemistry III – Lab course in Electrochemistry and Interfaces	Janek	Physical Chemistry
Chemistry-MNW26	Inorganic Reaction Mechanisms	Schindler	Inorganic Chemistry
Chemistry-MNW29	Research Topics in Inorganic Chemistry I	Schindler/Smarsly	Inorganic Chemistry
Chemistry-MNW31	Research Topics in Organic Chemistry I	Schreiner/Wegner /Göttlich	Organic Chemistry
Chemistry-MNW34	Modern Aspects of Physical Chemistry	Janek/Over/ Smarsly	Physical Chemistry
Chemistry-MNW36	(Organo)Catalysis and Synthesis	Schreiner/Wegner /Göttlich	Organic Chemistry
Physics-MP13	Semiconductor Physics I	Eickhoff /Klar	Solid State Physics
Physics-MP14	Semiconductor Physics II	Eickhoff /Klar	Solid State Physics
Physics-MP16	Introduction to Solid State Theory	Heiliger	Solid State Physics
Physics-MP17	Solid State Theory	Heiliger	Solid State Physics
Physics-MP25	Nano- and Microstructures in Sensor- and Actuator Systems	Eickhoff/Klar /Henning	Solid State Physics
Physics-MP35	Surface and Interface Physics I	Schlettwein/Dürr /Schirmeisen	Applied Physics

Research based modules:

Important: Research modules (10 CP) are directly arranged with a professor and can be flexibly defined! Modules may be combined to form e.g. one 20 CP module. The subject depends very much on the research interests of the student.

Course Code	Title	Responsible Professor	Institute
Chemistry-MNV01	Inorganic Chemistry, Advanced Synthesis and Characterisation	Schindler, Smarsly, N.N.	Inorganic Chemistry
Chemistry-MNV02	Advanced Organic Chemistry Laboratory	Schreiner, Göttlich, Wegner	Organic Chemistry
Chemistry-MNV03	Physical Chemistry and Materials Research	Janek, Smarsly, Over	Physical Chemistry
Chemistry-MNS01	Project Work Inorganic Chemistry	Schindler, Smarsly, N.N.	Inorganic Chemistry
Chemistry-MNS02	Project Work Organic Chemistry	Schreiner, Göttlich, Wegner	Organic Chemistry
Chemistry-MNS03	Project Work Physical Chemistry	Janek, Smarsly, Over	Physical Chemistry
Physics-MP-28 B	Modern Technologies of Conductive and Dielectric Materials	Göddenhenrich/ Schlettwein/Thummes	Applied Physics
Physics-MP-28 G	Micro- and Nanostructured Semiconductors	Klar /Eickhoff	Solid State Physics
Physics-MP-28 H	Bandstructure Calculations	Heiliger	Theoretical Physics
Physics-MP-28 Q	Synthesis of Micro- and Nano-Structured Materials	Klar, Eickhoff, Polity, Hofmann	Solid State Physics
Physics-MP-28 R	Surface and Interface Technologies	Dürr, Schirmeisen, Schlettwein	Applied Physics
MP-29 A	Multifunctional Thin Films	Klar, Eickhoff	Solid State Physics
Physics-MP-29 B	Applied Material Physics	Göddenhenrich/ Schlettwein/Thum-mes	Applied Physics
Physics-MP-29 G	Green's Functions in Solid State Theory	Heiliger	Theoretical Physics
Physics-MP-29 L	Low Temperature Plasma Physics	Thoma, Mitic	Plasma Physics

Faculty members and professors teaching in materials science; Full professors can be chosen as advisors; all listed faculty members offer research-based courses.

Faculty/Advisor	Institute	Research subjects (for the definition of research projects at JLU)
N.N.	Physical Chemistry	Energy storage materials, battery materials, carbon materials, nanostructures materials
Prof. Dr. M. Dürr	Applied Physics	Surface science, Surface spectroscopy, mass spectrometry
Prof. Dr. M. Eickhoff	Solid State Physics	Semiconductor physics, Micro- and nanostructures, nanowires, sensors
Dr. M. Elm	Phys. Chem./Physics	Magnetic materials for spintronics, nanostructured magnetic and ionic materials
Prof. Dr. C. Heiliger	Theoretical Physics	Computer-based modeling and simulation of functional materials, semiconductors, thermoelectrics
Dr. D. Hofmann (apl.-Prof.)	Solid State Physics	Semiconductors,
Prof. Dr. J. Janek	Physical Chemistry	Solid state ionics, fuel cell materials, battery materials, mixed conductors, solid state electrochemistry

Prof. Dr. P. J. Klar	Solid State Physics	Nano- and microstructured materials, semiconductors,
Dr. R. Marschall	Physical Chemistry	Photoelectrochemistry, materials for solar harvesting
Prof. Dr. W.-E. Müller	Inorganic Chemistry	Thermoelectric materials
Dr. A. Polity (PD)	Solid State Physics	Thin films and thin film deposition, sputtering
Prof. Dr. Z. Mitic	Plasma Physics	Plasma techniques for materials science
Prof. Dr. D. Mollenhauer	Theoretical Chemistry	Computer-based modeling of interfaces and surfaces
Prof. Dr. H. Over	Physical Chemistry	Surface science, heterogeneous catalysis, electrocatalysis, surface analysis
Prof. Dr. S. Schindler	Inorganic Chemistry	Complex chemistry
Prof. Dr. A. Schirmeisen	Applied Physics	Surface science, scanning probe microscopy
Prof. Dr. D. Schlettwein	Applied Physics	Hybrid materials, photochemistry, photovoltaics, photoelectrochemistry, organic semiconductors
Prof. Dr. P. R. Schreiner	Organic Chemistry	Synthesis of organic molecules, computational chemistry
Prof. Dr. B. Smarsly	Physical/Inorg. Chemistry	Nanostructured materials, porous materials, materials for catalysis and sensing
Dr. J. Teubert	Solid State Physics	Semiconductor physics
Prof. Dr. M. Thoma	Plasma Physics	Plasma-based techniques
Prof. Dr. H. Wegner	Organic Chemistry	Carbon-based materials, synthesis
N. N.	Inorganic Chemistry	…

An example of the course list in KU Graduate School of Science and Engineering

It is the course list of the standard (Japanese) course in Chemistry, Materials and Bioengineering Major. In Group C, the course marked with 'M' is for material science, 'A' is for applied chemistry, and 'B' is for bio-related chemistry.

Example of lectures in Chemistry, Materials and Bioengineering Major (standard course):

Group A	
Engineering Ethics	Current Issues on Energy and Environment
Management of Technology	Economy and Industry
Intellectual Property	Technology and Venture
Philosophy of Science and Technology	

Group B (Chemistry, Materials and Bioengineering Major)	
Safety Technology	Science for Material Interface
X-ray diffraction	Bio-related Chemistry
Material Process Engineering	Biomaterials Science
Material Energy Technology	Advanced Life Science
Advanced Industrial Organic Chemistry	Advanced Biotechnology
Polymer Science	

Group C **Chemistry and Materials Engineering**	**Group C** **Life Science and Biotechnology**
B) Advanced Biomaterials Chemistry	Advanced Pharmaceutical Research and
B) Advanced Biocoordination Chemistry	Development
M) Adv. Composite Processing Engineering	Adv. Pharmacological Action of Medicines

M) Advanced Material Science of Iron and Steel	Advanced Nutritional Chemistry
A) Advanced Energy Electrochemistry	Advanced Molecular Genetics
M) Advanced Ceramic Materials	Adv. Technology of Microorganism Control
A) Advanced Applied Colloidal Chemistry	Advanced Molecular Cell Biology
B) Advanced Glycoconjugate Chemistry	Adv. Environmental Sciences & Technology
M) Advanced Solidification Process Engineering	Advanced Food Chemistry
B) Advanced Chiral Molecular Chemistry	Advanced Food Microbial Biotechnology
M) Advanced Metallic Materials for Biomedical and Healthcare Applications	Adv. Environmental Microbiotechnology
A) Advanced Mass Spectrometry	Advanced Bioprocess Systems Engineering
M) Advanced Crystal and Electronic Structure	Advanced Bioinformatics
A) Advanced lecture in Surface Engineering	Advanced English for Life Science and Biotechnology
A) Advanced Chemistry of Organic Semiconductor Molecule	
M) Advanced Process Metallurgy	
A) Advanced Catalytic Organic Chemistry	
ABM) Science and Technology English	