

Joint Curriculum

Master of Science in Electrical Engineering and Information Technology

Participating Institutions: OVGU (Magdeburg, Germany) and KNRTU-KAI (Kazan, Russia)

Duration of Study: 2 years

Place for Study: 1st, 2nd and 4th semesters – at KNRTU-KAI, 3rd semester – at OVGU Magdeburg

The following tabular gives an overview about the collaborative Master program. Details will be arranged and documented on operational level between responsible representatives of the participating faculties.

1st semester

| Nº | Module | Credits of the Module, ECTS | Credits of the Module, Russian | Minimum Contact Hours | Minimum Total Student Workload, Hours |
|--|--------------------------------------|--------------------------------|--------------------------------------|--------------------------|--|
| (a) Technical Compulsory Modules: | | | | | |
| I | Electromagnetic Field Theory | 5 | 4 | 42 | 150 |
| II | Power Electronics | 5 | 4 | 42 | 150 |
| III | Systems and Control | 5 | 4 | 42 | 150 |
| IV | Electronic Circuits | 5 | 5 | 42 | 150 |
| V | Digital Information Processing | 5 | 4 | 42 | 150 |
| VI | Power Network Planning and Operation | 5 | 4 | 42 | 150 |
| Total | | 30 | 25 | 252 | 900 |
| (b) Optional Module: | | | | | |

| | | | | | |
|---|-------------------------------------|--|---|-----|-----|
| I | Foreign Language (English / German) | | 5 | 180 | 360 |
|---|-------------------------------------|--|---|-----|-----|

2nd semester

| No | Module | Credits of the Module, ECTS | Credits of the Module, Russian | Minimum Contact Hours | Minimum Total Student Workload, Hours |
|---|---|-----------------------------|--------------------------------|-----------------------|---------------------------------------|
| (a) Technical Compulsory Module: | | | | | |
| I | Digital Communication Systems | 5 | 3 | 42 | 150 |
| (b) Non-Technical Compulsory Module: | | | | | |
| I | Project | 5 | 8 | 42 | 150 |
| (c) Technical Elective Modules Power and Energy: | | | | | |
| I | Modern Concepts of EMC and EMC Measurements | 5 | 5 | 28 | 150 |
| II | Advanced Power Electronics | 5 | 4 | 42 | 150 |
| III | Renewable Energy Sources | 5 | 3 | 42 | 150 |
| (d) Non-Technical Elective Module: | | | | | |
| I | | 5 | 2 | 42 | 150 |
| Total | | 30 | 25 | 238 | 900 |
| (e) Optional Module: | | | | | |
| I | Foreign Language (English / German) | | 5 | 180 | 360 |

3rd semester

| No | Module | Credits of the Module, ECTS | Credits of the Module, Russian | Minimum Contact Hours | Minimum Total Student Workload, Hours |
|--|---|-----------------------------|--------------------------------|-----------------------|---------------------------------------|
| (a) Technical Compulsory Modules: | | | | | |
| I | Modern Concepts of EMC and EMC Measurements | 5 | 4 | 42 | 150 |
| II | Power Electronic Components and Systems | 5 | 6 | 42 | 150 |
| III | Power System Economics and Special Topics | 5 | 6 | 42 | 150 |

| | | | | | |
|---|--------------------|----|----|----|-----|
| IV | Integrated Project | 10 | 10 | 84 | 300 |
| (b)) Non-Technical Elective Module: | | | | | |
| I | | 5 | 4 | | |
| Total | | 30 | 30 | | |

4th semester

| Nº | Module | Credits of the Module, ECTS | Credits of the Module, Russian | Minimum Contact Hours | Minimum Total Student Workload, Hours |
|--------------------------------|---------------|-----------------------------|--------------------------------|-----------------------|---------------------------------------|
| (a) Compulsory modules: | | | | | |
| I | Master Thesis | 30 | 30 | | 900 |
| Total | | 30 | 30 | | 900 |

On behalf of OVGU Magdeburg



Prof. Jens Stracke
Rector




Prof. Andreas Lindemann
Coordinator of the MSc Program

Prof. Dr.-Ing. A. Lindemann

19. FEB. 2014

On behalf of KNRTU-KAI



Prof. Albert Gilmutdinov
Rector



Prof. Andrey Ferenc
Coordinator of the MSc Program

Courses in the Collaborative Master Programme Electrical Engineering and Information Technology

amendment to the contract between
Kazan National Research Technical University A.N.Tupolev — KNRTU-KAI
and
Otto-von-Guericke-Universität Magdeburg — OvGU
entered on 29.01.2014

draft of September 12, 2019

1 Preamble

The following rules apply for the Collaborative Master Programme Electrical Engineering and Information Technology:

- Students should consider section 2 to plan their schedule.
- Administration will acknowledge courses according to section 3.

Subsections may reflect changes effectuated between different academic years.

2 Courses

2.1 Programme 2019/2020 at KNRTU-KAI and 2020/2021 at OvGU and following years

1. semester at the Faculty of Electrical Engineering at KNRTU-KAI
 - (a) compulsory technical courses
 - i. Electromagnetic field theory (6CP RU)
 - ii. Systems and control (6CP RU)
 - iii. Electronic circuits (6CP RU)
 - iv. Advanced digital signal processing (Digital information processing) (6CP RU)
 - (b) basic courses
 - i. Information technology in electrical engineering (4CP RU)
 - (c) compulsory non-technical courses
 - i. Philosophical problems of science and technology (2CP RU)

A part of the aforementioned courses may be taught by a teacher from OvGU at KNRTU-KAI usually in September on mutual agreement six months prior to the semester.

2. semester at the Faculty of Electrical Engineering at KNRTU-KAI
 - (a) compulsory technical courses
 - i. Digital communication systems for control of power network (3CP RU)
 - ii. Research project I — lab work (6CP RU)

- iii. Modern concepts of EMC and EMC measurements — part I (3CP RU)
- iv. Advanced power electronics (4CP RU)
- v. Renewable energy sources (3CP RU)
- vi. Research work in the semester (3CP RU)
- vii. Scientific and production practise (6CP RU)
- (b) compulsory non-technical courses
 - i. Foreign language professional orientation (English) (2CP RU)
- (c) selectable non-technical courses
 - i. Foreign Language — German (3CP RU)

A part of the aforementioned courses may be taught by a teacher from OvGU at KNRTU-KAI usually in March on mutual agreement six months prior to the semester.

3. semester at the Faculty for Electrical Engineering and Information Technology at OvGU
 - (a) compulsory technical courses
 - i. Power Electronics (5CP ECTS)
 - ii. Power Network Planning and Operation (5CP ECTS)
 - iii. Modern concepts of EMC and EMC measurement — part 2 exercise and lab (5CP ECTS)
 - iv. Power electronic components and systems (5CP ECTS)
 - v. Power System Economics and Special Topics (5CP ECTS)
 - (b) compulsory non-technical courses
 - i. Research project (5CP ECTS)
4. semester at the Faculty of Electrical Engineering at KNRTU-KAI
 - (a) compulsory module
 - i. Research practise (6CP RU)
 - ii. Final state certification (3CP RU)
 - iii. Master's thesis (24CP RU)

The thesis will be defended in English at KNRTU-KAI. A teacher from OvGU can attend personally or via video conference.

2.2 Programme 2014/2015 at KNRTU-KAI and 2015/2016 at OvGU and following years

1. semester at the Faculty of Electrical Engineering at KNRTU-KAI
 - (a) compulsory technical courses
 - i. Electromagnetic field theory (6CP RU)
 - ii. Systems and control (6CP RU)
 - iii. Electronic circuits (6CP RU)
 - iv. Advanced digital signal processing (Digital information processing) (6CP RU)
 - (b) basic courses
 - i. Additional chapters of mathematics (3CP RU)
 - ii. Computer, network and information technology (3CP RU)

A part of the aforementioned courses may be taught by a teacher from OvGU at KNRTU-KAI usually in September on mutual agreement six months prior to the semester.

2. semester at the Faculty of Electrical Engineering at KNRTU-KAI

- (a) compulsory technical courses
 - i. Digital communication systems for control of power network (3CP RU)
 - ii. Research project I — lab work (6CP RU)
 - iii. Modern concepts of EMC and EMC measurements — part I (3CP RU)
 - iv. Advanced power electronics (4CP RU)
 - v. Renewable energy sources (3CP RU)
 - vi. Research work in the semester (3CP RU)
 - vii. Scientific and production practise (6CP RU)
- (b) compulsory non-technical courses
 - i. Philosophy of technical sciences (2CP RU)
- (c) selectable non-technical courses
 - i. Foreign Language — German (3CP RU)

A part of the aforementioned courses may be taught by a teacher from OvGU at KNRTU-KAI usually in March on mutual agreement six months prior to the semester.

3. semester at the Faculty for Electrical Engineering and Information Technology at OvGU

- (a) compulsory technical courses
 - i. Power Electronics (5CP ECTS)
 - ii. Power Network Planning and Operation (5CP ECTS)
 - iii. Modern concepts of EMC and EMC measurement — part 2 exercise and lab (5CP ECTS)
 - iv. Power electronic components and systems (5CP ECTS)
 - v. Power System Economics and Special Topics (5CP ECTS)
- (b) compulsory non-technical courses
 - i. Research project (5CP ECTS)

4. semester at the Faculty of Electrical Engineering at KNRTU-KAI

- (a) compulsory module
 - i. Research practise (6CP RU)
 - ii. Final state certification (3CP RU)
 - iii. Master's thesis (24CP RU)

The thesis will be defended in English at KNRTU-KAI. A teacher from OvGU can attend personally or via video conference.

3 Grades

3.1 Acknowledgement of grades of KNRTU-KAI in the certificates of OvGU

3.1.1 Preamble

The collaborative master program is formally treated as "Teilstudium" — i. e., the courses taken at KNRTU-KAI are acknowledged and in conjunction with the courses taken at Otto-von-Guericke-Universität lead to the regular Master degree of the program Electrical Engineering and Information Technology. The rules in the governing documents of this program apply.

3.1.2 Equivalent modules

Programme 2019/2020 at KNRTU-KAI and 2020/2021 at OvGU and following years In the following, the courses listed in the corresponding section 2.1 are referenced.

- compulsory technical modules
 - Electromagnetic Field Theory (5CP ECTS): module 1(a)i acknowledged as equivalent
 - Systems and control (5CP ECTS): module 1(a)ii acknowledged as equivalent
 - Electronic circuits (5CP ECTS): module 1(a)iii acknowledged as equivalent
 - Digital Communication Systems (5CP ECTS): module 2(a)i acknowledged as equivalent
 - Digital Information Processing (5CP ECTS): module 1(a)iv acknowledged as equivalent
- selectable technical modules
 - Modern concepts of EMC and EMC measurement (10CP ECTS): Both modules 2(a)iii and 3(a)iii together acknowledged as equivalent, the grade is averaged with equal weight of both parts.
 - Advanced Power Electronics (5CP ECTS): module 2(a)iv acknowledged as equivalent
 - Renewable energy sources (5CP ECTS): module 2(a)v acknowledged as equivalent
 - Integrated project (10CP ECTS): 2(a)ii together with 2(a)vi acknowledged as equivalent, the grade is averaged with a weight of $\frac{2}{3}$ for 2(a)ii and $\frac{1}{3}$ for 2(a)vi.
- selectable non-technical modules¹
 - 1(c)i acknowledged under its original name (5CP ECTS)
 - 2(c)i acknowledged under its original name (5CP ECTS)
- master thesis
 - 4(a)iii acknowledged as master thesis with 4(a)ii as colloquium (30CP ECTS)

Programme 2014/2015 at KNRTU-KAI and 2015/2016 at OvGU and following years In the following, the courses listed in the corresponding section 2.2 are referenced.

- compulsory technical modules
 - Electromagnetic Field Theory (5CP ECTS): module 1(a)i acknowledged as equivalent
 - Systems and control (5CP ECTS): module 1(a)ii acknowledged as equivalent
 - Electronic circuits (5CP ECTS): module 1(a)iii acknowledged as equivalent
 - Digital Communication Systems (5CP ECTS): module 2(a)i acknowledged as equivalent
 - Digital Information Processing (5CP ECTS): module 1(a)iv acknowledged as equivalent
- selectable technical modules

¹The students must take care that they attend at least one German course at KNRTU-KAI to achieve the required credit points. English is a prerequisite for admission to the program and cannot be acknowledged again here.

- Modern concepts of EMC and EMC measurement (10CP ECTS): Both modules 2(a)iii and 3(a)iii together acknowledged as equivalent, the grade is averaged with equal weight of both parts.
- Advanced Power Electronics (5CP ECTS): module 2(a)iv acknowledged as equivalent
- Renewable energy sources (5CP ECTS): module 2(a)v acknowledged as equivalent
- Integrated project (10CP ECTS): 2(a)ii together with 2(a)vi acknowledged as equivalent, the grade is averaged with a weight of $\frac{2}{3}$ for 2(a)ii and $\frac{1}{3}$ for 2(a)vi.
- selectable non-technical modules²
 - 2(b)i acknowledged under its original name (5CP ECTS)
 - 2(c)i acknowledged under its original name (5CP ECTS)
- master thesis
 - 4(a)iii acknowledged as master thesis with 4(a)ii as colloquium (30CP ECTS)

3.1.3 Equivalent grades

| KNRTU-KAI | → | OvGU | |
|-----------|---|-------|--------------|
| up to | | grade | designation |
| 50% | | 5,0 | failed |
| 55% | | 4,0 | sufficient |
| 60% | | 3,7 | sufficient |
| 65% | | 3,3 | satisfactory |
| 70% | | 3,0 | satisfactory |
| 75% | | 2,7 | satisfactory |
| 80% | | 2,3 | good |
| 85% | | 2,0 | good |
| 90% | | 1,7 | good |
| 95% | | 1,3 | very good |
| 100% | | 1,0 | very good |

3.2 Acknowledgement of grades of OvGU in the certificates of KNRTU-KAI

3.2.1 Equivalent modules

Programme 2014/2015 at KNRTU-KAI and 2015/2016 at OvGU and following years In the following, the courses listed in the corresponding section 2.1 are referenced.

- compulsory technical modules
 - to be determined by KNRTU-KAI

3.2.2 Equivalent grades

to be determined by KNRTU-KAI

²The students must take care that they attend at least one German course at KNRTU-KAI to achieve the required credit points. English is a prerequisite for admission to the program and cannot be acknowledged again here.

Signatures

September 12, 2019

Prof. Andrey Ferenets, KNRTU-KAI

Prof. Roberto Leidhold, OvGU



Prof. Roberto Leidhold
OvGU FEIT IESY
Lehrstuhl für elektrische Antriebssysteme

A Changes

- 04. September 2015:
 - added acknowledgement of colloquium of master thesis 4(a)ii in section 3.1.2
 - changed tabular in section 3.1.3 in the way that 50% still means failed
- 12. September 2019
added the sections with respect to the programme 2019/2020 at KNRTU-KAI and 2020/2021 at OvGU and following years