FOM Hochschule

BACHELOR-URKUNDE

Die staatlich anerkannte FOM Hochschule für Oekonomie & Management
verleiht auf Grundlage des Gesetzes über die Hochschulen des Landes
Nordrhein-Westfalen (§ 66 HG NRW) mit dieser Urkunde

Based on the Act of the Universities of the Federal State North Rhine-Westphalia (§ 66 HG NRW) the state-approved FOM University of Applied Sciences hereby certifies that

Bao Trung Le Nguyen

geboren am 12. November 1991 in Erlabrunn (Deutschland)
born 12 November 1991 in Erlabrunn (Germany)

aufgrund der erfolgreich bestandenen Abschlussprüfung im Studiengang
upon the successful completion of the study programme in

Informatik

Computer Sciences

den akademischen Grad
has been awarded the degree of

Bachelor of Science (B.Sc.)

Essen, 25. September 2023

Hochschule FOM für Oekonomie & Management

Der Rektor
Rector
Prof. Dr. Burghard Hermeier

Diploma Supplement

This Diploma Supplement model was developed by the European Commission, Council of Europe and UNESCO/CEPES. The purpose of the supplement is to provide sufficient independent data to improve the international 'transparency' and fair academic and professional recognition of qualifications (diplomas, degrees, certificates etc.). It is designed to provide a description of the nature, level, context, content and status of the studies that were pursued and successfully completed by the individual named on the original qualification to which this supplement is appended. It should be free from any value judgements, equivalence statements or suggestions about recognition. Information in all eight sections should be provided. Where information is not provided, an explanation should give the reason why.

1. INFORMATION IDENTIFYING THE HOLDER OF THE QUALIFICATION

1.1 Family Name(s) / 1.2 First Name(s)

Le Nguyen, Bao Trung

1.3 Date of Birth

12 November 1991

1.4 Student Identification Number or Code

521796

2. QUALIFICATION

2.1 Name of Qualification and (if applicable) Title Conferred (full, abbreviated; in original language)

Bachelor of Science (B.Sc.)

2.2 Main Field(s) of Study

Computer Sciences

2.3 Name and Status of Institution Awarding the Qualification (in original language)

FOM Hochschule für Oekonomie & Management, University of Applied Sciences, Private Institution

2.4 Name and Status of Institution Administering Studies (in original language)

Same as in 2.3

2.5 Language(s) of Instruction / Examination

German

3. LEVEL AND DURATION OF THE QUALIFICATION

3.1 Level of the Qualification

First degree, application oriented with thesis

3.2 Official Duration of the Programme in Credits and Years

3.5 years (7 semesters), 180 ECTS-Credits

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3.3 Access Requirements

General requirements:
Higher Education Entrance Qualification (HEEQ), general, specialized or HEEQ for University of Applied Sciences or foreign equivalent, cf. Sec. 8.7.

Special requirements: None

4. INFORMATION ON THE PROGRAMME COMPLETED AND THE RESULTS OBTAINED

4.1 Mode of Study

Part-time programme, job-integrated programme

4.2 Programme Learning Outcomes

The objective of the programme is to provide the student with a solid and well-rounded education in computer science. In the first semesters the curriculum includes such subjects as Mathematical Principles of Computer Science, Concepts of Procedural Programming, Database Management, Digital Control Technology, Concepts of Object-Oriented Programming, Software Engineering, Big Data & Data Science, IT & Media Law, Concepts of Script Language-Oriented Programming and IT Infrastructure. In the second half of the programme it consists of subjects as Project Management, Business Process Modelling, Algorithms & Data Structures, Distributed Systems, Mechatronic, Operating Systems, IT-Trends & Innovation, Web Technologies, Artificial Intelligence, Embedded Systems and IoT, SmartX & User Experience. The programme concludes with the student submitting a thesis paper.
The programme runs for 7 semesters and consists of 29 modules, including 1 module for the submission of the thesis.

Upon successful completion of this programme, students will be able to:

General:

- have an in-depth understanding of basic principles and applications in computer science. They have the ability to apply methods, procedure models tools and systems in order to solve practically relevant problems taking in to consideration social, scientific and ethic factors. They possess in-depth knowledge about the implementation and validation of complex informatic systems to inform, communicate and control and employ these in various applications and independently manage projects. They thereby assume
  a position of responsibility in a team and fulfil requirements both for specialist and leadership positions and they qualify to take advanced study programmes.

Professional Competence (Knowledge and Understanding)

- define, describe and apply key mathematical, logical and physical principles of computer science.
- are familiar with and confidently apply fundamental skills in computer science (e.g. algorithms, data structures and programming). They are familiar with various programming paradigms, have the technical knowledge of modern operating systems, computer architecture and computer networks and take into consideration IT security concepts and technologies as well as legal provisions in the field of IT and media law when using these on concrete problems within the entrepreneurial application context.
- assess the possibilities and limitations of IT procedures and tools and use them in a situation-related and appropriate manner
- describe current developments and trends in the IT sector and plan projects and processes in a company accordingly and implement these against the background of continually growing volumes of data.
- are familiar with procedures of machine learning and contribute them to projects in the field of artificial intelligence

Methodological Competence (Use, Application of Knowledge and Knowledge Creation)

- identify and analyze known IT problems in the entrepreneurial application context and formulate them using formal models.
- select different solution approaches for typical problems and to develop, ergonomically design, test and

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evaluate program systems/hard and software systems using appropriate tools and methods (software development, technical design and system conception of IoT and embedded systems, mobile applications, etc.)
- transfer current problem-adequate IT methods and procedure models into a grown operational practice and to evaluate the newly generated application context.
- design digital strategies and accompany migration projects
- understand and effectively use the methods of IT, database and project management and successfully plan and supervise IT projects and use project management methods and tools in a targeted way
- reflect scientific topics, write scientific papers (seminar papers or dissertations) under guidance and application of research methods and present their results adequately

Social Competence (Communication and Cooperation Skills)
- successfully use presentation techniques and project management methods in a targeted way
- formulate theoretical knowledge and defined solutions in a professional manner and represent these thoughtfully and systematically in discussions with experts and laypersons.
- assume a position of responsibility in a team and proactive manage conflicts in a team situation

Personal Competence (Scientific Self-Conception/Professionalism)
- select appropriate organisational and work techniques and optimally manage their time.
- independendly complement and deepen their existing knowledge, they have acquired in their studies, and adapt this to current developments in the respective field.
- assess the social effects of their IT activities and information technology in general, and critically question them

4.3 Programme Details, Individual Credits Gained and Grades/Marks Obtained

See Degree Certificate

4.4 Grading System and (if available) Grade Distribution Table

Due to the low total number of grades awarded up to now, a valid grade distribution scheme cannot be established.

4.5 Overall Classification of the Qualification (in original language)

1,7 (gut) (for further information look at 8.6 Grading Scheme)

Based on Comprehensive Final Examination; cf. Prüfungszeugnis (Degree Certificate)

5. FUNCTION OF THE QUALIFICATION

5.1 Access to Further Study

Qualifies to apply for admission for Master studies.

5.2 Access to a Regulated Profession (if applicable)

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6. ADDITIONAL INFORMATION

6.1 Additional Information

The degree holder was deputy class speaker on the student parliament from 01.09.2019 to 31.08.2022.

6.2 Further Information Sources

On the institution and the programme: http://www.fom.de
On the certifying authorities: www.wissenschaftsrat.de; http://www.fibaa.org
For national information sources c.f. Sect. 8.8

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7. CERTIFICATION

This Diploma Supplement refers to the following original documents:
Document on the award of the academic degree (Urkunde über die Verleihung des Akademischen Grades)
Bachelor-Urkunde dated 25.09.2023
Prüfungszeugnis (Degree Certificate) dated 25.09.2023

8. NATIONAL HIGHER EDUCATION SYSTEM

The information on the national higher education system on the following pages provides a context for the qualification and the type of higher education that awarded it.

Essen, 25.09.2023
Certification Date

Professor Dr. Stephan Bulheller
Chair of the Board of Examiners

Hochschule FOM für Ökonomie & Management

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8. INFORMATION ON THE GERMAN HIGHER EDUCATION SYSTEM*1

8.1 Types of Institutions and Institutional Status

Higher education (HE) studies in Germany are offered at three types of Higher Education Institutions (HEI).*2

- *Universitäten* (Universities) including various specialized institutions, offer the whole range of academic disciplines. In the German tradition, universities focus in particular on basic research so that advanced stages of study have mainly theoretical orientation and research-oriented components.

- *Fachhochschulen (FH)/Hochschulen für Angewandte Wissenschaften (HAW)* (Universities of Applied Sciences, UAS) concentrate their study programmes in engineering and other technical disciplines, business-related studies, social work, and design areas. The common mission of applied research and development implies an application-oriented focus of studies, which includes integrated and supervised work assignments in industry, enterprises or other relevant institutions.

- *Kunst- und Musikhochschulen* (Universities of Art/Music) offer studies for artistic careers in fine arts, performing arts and music; in such fields as directing, production, writing in theatre, film, and other media; and in a variety of design areas, architecture, media and communication.

Higher Education Institutions are either state or state-recognized institutions. In their operations, including the organization of studies and the designation and award of degrees, they are both subject to higher education legislation.

8.2 Types of Programmes and Degrees Awarded

Studies in all three types of institutions have traditionally been offered in integrated "long" (one-tier) programmes leading to *Diplom-* or *Magister Artium* degrees or completed by a *Staatsprüfung* (State Examination).

Within the framework of the Bologna-Process one-tier study programmes are successively being replaced by a two-tier study system. Since 1998, two-tier degrees (Bachelor and Master) have been introduced in almost all study programmes. This change is designed to provide enlarged variety and flexibility to students in planning and pursuing educational objectives, it also enhances international compatibility of studies.

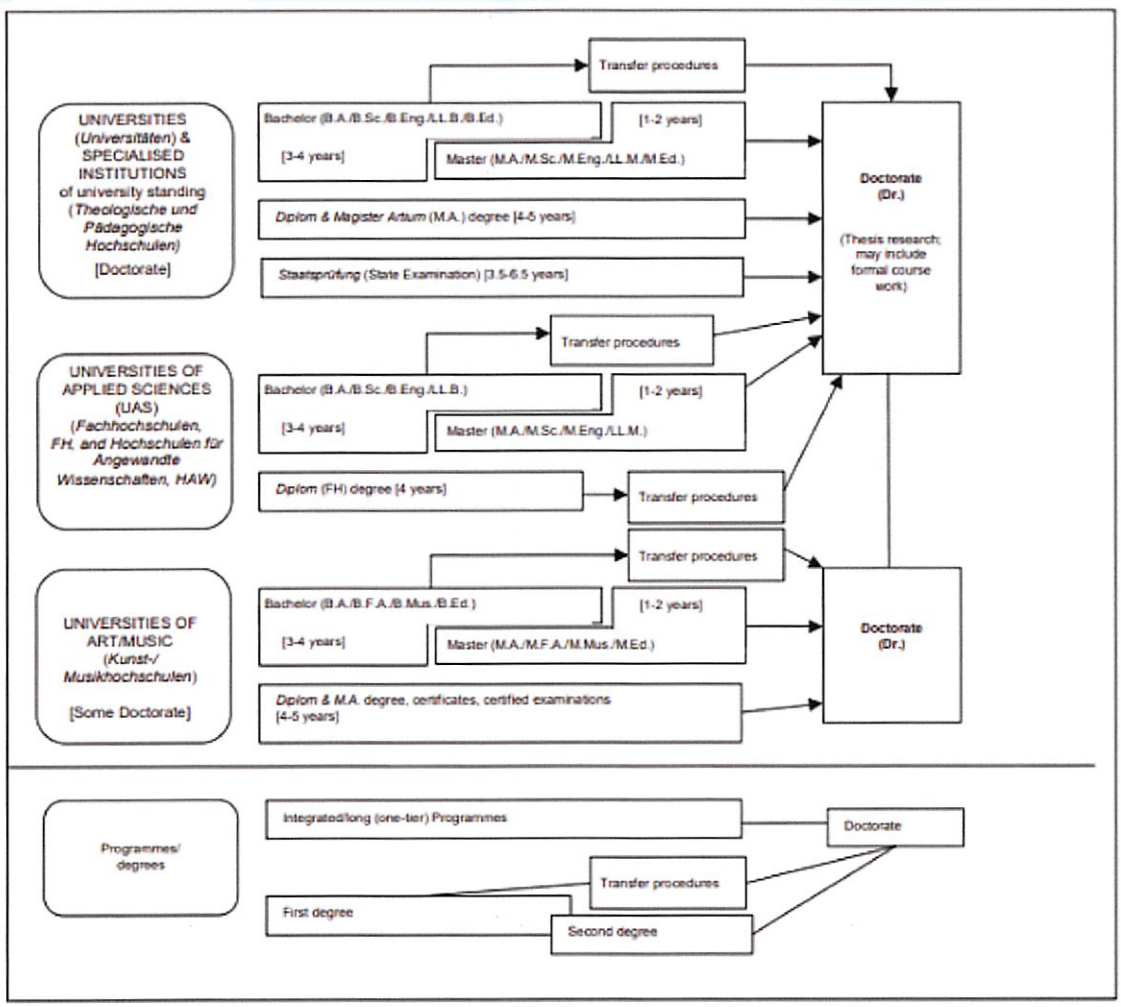
The German Qualifications Framework for Higher Education Qualifications (HQR)*3 describes the qualification levels as well as the resulting qualifications and competences of the graduates. The three levels of the HQR correspond to the levels 6, 7 and 8 of the German Qualifications Framework for Lifelong Learning*4 and the European Qualifications Framework for Lifelong Learning*5.

For details cf. Sec. 8.4.1, 8.4.2, and 8.4.3 respectively. Table 1 provides a synoptic summary.

8.3 Approval/Accreditation of Programmes and Degrees

To ensure quality and comparability of qualifications, the organization of studies and general degree requirements have to conform to principles and regulations established by the Standing Conference of the Ministers of Education and Cultural Affairs of the *Länder* in the Federal Republic of Germany (KMK).*6 In 1999, a system of accreditation for Bachelor's and Master's programmes of study has become operational. All new programmes have to be accredited under this scheme; after a successful accreditation they receive the seal of the Accreditation Council.*7

Table 1: Institutions, Programmes and Degrees in German Higher Education



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8.4 Organization and Structure of Studies

The following programmes apply to all three types of institutions. Bachelor's and Master's study programmes may be studied consecutively, at various higher education institutions, at different types of higher education institutions and with phases of professional work between the first and the second qualification. The organization of the study programmes makes use of modular components and of the European Credit Transfer and Accumulation System (ECTS) with 30 credits corresponding to one semester.

8.4.1 Bachelor

Bachelor's degree programmes lay the academic foundations, provide methodological competences and include skills related to the professional field.
The Bachelor's degree is awarded after 3 to 4 years.
The Bachelor's degree programme includes a thesis requirement. Study programmes leading to the Bachelor's degree must be accredited according to the Interstate study accreditation treaty. *8
First degree programmes (Bachelor) lead to Bachelor of Arts (B.A.), Bachelor of Science (B.Sc.), Bachelor of Engineering (B.Eng.), Bachelor of Laws (LL.B.), Bachelor of Fine Arts (B.F.A.), Bachelor of Music (B.Mus.) or Bachelor of Education (B.Ed.).
The Bachelor's degree corresponds to level 6 of the German Qualifications Framework/ European Qualifications Framework.

8.4.2 Master

Master is the second degree after another 1 to 2 years. Master's programmes may be differentiated by the profile types "practice-oriented" and "research-oriented". Higher Education Institutions define the profile.
The Master's degree programme includes a thesis requirement. Study programmes leading to the Master's degree must be accredited according to the Interstate study accreditation treaty.*9
Second degree programmes (Master) lead to Master of Arts (M.A.), Master of Science (M.Sc.), Master of Engineering (M.Eng.), Master of Laws (L.L.M.), Master of Fine Arts (M.F.A.), Master of Music (M.Mus.) or Master of Education (M.Ed.).
Master´s programmes which are designed for continuing education may carry other designations (e.g. MBA).
The Master's degree corresponds to level 7 of the German Qualifications Framework/ European Qualifications Framework.

8.4.3 Integrated "Long" Programmes (One-Tier): *Diplom* degrees, *Magister Artium, Staatsprüfung*

An integrated study programme is either single-discipline (*Diplom* degrees, most programmes completed by a *Staatsprüfung*) or comprises a combination of either two major or one major and two minor fields (*Magister Artium*). The first stage (1.5 to 2 years) focuses on broad orientations and foundations of the field(s) of study. An Intermediate Examination (*Diplom-Vorprüfung* for *Diplom* degrees; *Zwischenprüfung* or credit requirements for the *Magister Artium*) is prerequisite to enter the second stage of advanced studies and specialisations. Degree requirements include submission of a thesis (up to 6 months duration) and comprehensive final written and oral examinations. Similar regulations apply to studies leading to a *Staatsprüfung*. The level of qualification is equivalent to the Master's level.

- Integrated studies at *Universitäten (U)* last 4 to 5 years (*Diplom* degree, *Magister Artium*) or 3.5 to 6.5 years (*Staatsprüfung*). The *Diplom* degree is awarded in engineering disciplines, the natural sciences as well as economics and business. In the humanities, the corresponding degree is usually the *Magister Artium* (M.A.). In the social sciences, the practice varies as a matter of institutional traditions. Studies preparing for the legal, medical and pharmaceutical professions are completed by a *Staatsprüfung*. This applies also to studies preparing for teaching professions of some *Länder*.
The three qualifications (*Diplom*, *Magister Artium* and *Staatsprüfung*) are academically equivalent and correspond to level 7 of the German Qualifications Framework/European Qualifications Framework.
They qualify to apply for admission to doctoral studies. Further prerequisites for admission may be defined by the Higher Education Institution, cf. Sec. 8.5.

- Integrated studies at *Fachhochschulen (FH)/Hochschulen für Angewandte Wissenschaften (HAW)* (Universities of Applied Sciences, UAS) last 4 years and lead to a *Diplom (FH)* degree which corresponds to level 6 of the German Qualifications Framework/European Qualifications Framework.
Qualified graduates of FH/HAW/UAS may apply for admission to doctoral studies at doctorate-granting institutions, cf. Sec. 8.5.

- Studies at *Kunst- and Musikhochschulen* (Universities of Art/Music etc.) are more diverse in their organisation, depending on the field and individual objectives. In addition to *Diplom/Magister* degrees, the integrated study programme awards include certificates and certified examinations for specialised areas and professional purposes.

8.5 Doctorate

Universities as well as specialised institutions of university standing, some of the FH/HAW/UAS and some Universities of Art/Music are doctorate-granting institutions. Formal prerequisite for admission to doctoral work is a qualified Master's degree (UAS and U), a *Magister* degree, a *Diplom*, a *Staatsprüfung*, or a foreign equivalent. Comparable degrees from universities of art and music can in exceptional cases (study programmes such as music theory, musicology, pedagogy of arts and music, media studies) also formally qualify for doctoral work. Particularly qualified holders of a Bachelor's degree or a *Diplom (FH)* degree may also be admitted to doctoral studies without acquisition of a further degree by means of a procedure to determine their aptitude. The universities respectively the doctorate-granting institutions regulate entry to a doctorate as well as the structure of the procedure to determine aptitude. Admission further requires the acceptance of the Dissertation research project by a professor as a supervisor.
The doctoral degree corresponds to level 8 of the German Qualifications Framework/ European Qualifications Framework.

8.6 Grading Scheme

The grading scheme in Germany usually comprises five levels (with numerical equivalents; intermediate grades may be given): "*Sehr Gut*" (1) = Very Good; "*Gut*" (2) = Good; "*Befriedigend*" (3) = Satisfactory; "*Ausreichend*" (4) = Sufficient; "*Nicht ausreichend*" (5) = Non-Sufficient/Fail.
The minimum passing grade is "*Ausreichend*" (4). Verbal designations of grades may vary in some cases and for doctoral degrees.
In addition, grade distribution tables as described in the ECTS Users' Guide are used to indicate the relative distribution of grades within a reference group.

8.7 Access to Higher Education

The General Higher Education Entrance Qualification (*Allgemeine Hochschulreife, Abitur*) after 12 to 13 years of schooling allows for admission to all higher educational studies. Specialized variants (*Fachgebundende Hochschulreife*) allow for admission at Fachhochschulen (UAS), universities and equivalent higher education institutions, but only in particular disciplines. Access to study programmes at *Fachhochschulen* (UAS) is also possible with a *Fachhochschulreife*, which can usually be acquired after 12 years of schooling. Admission to study programmes at Universities of Art/Music and comparable study programmes at other higher education institutions as well as admission to a study programme in sports may be based on other or additional evidence demonstrating individual aptitude.
Applicants with a vocational qualification but without a school-based higher education entrance qualification are entitled to a general higher education entrance qualification and thus to access to all study programmes, provided they have obtained advanced further training certificates in particular state-regulated vocational fields (e.g. *Meister/Meisterin im Handwerk, Industriemeister/in, Fachwirt/in (IHK und HWK), staatlich geprüfte/r Betriebswirt/in, staatliche geprüfte/r Gestalter/in, staatlich geprüfte/r Erzieher/in*). Vocationally qualified applicants can obtain a *Fachgebundende Hochschulreife* after completing a state-regulated vocational education of at least two years' duration plus professional practice of normally at least three years' duration, after having successfully passed an aptitude test at a higher education institution or other state institution; the aptitude test may be replaced by successfully completed trial studies of at least one year's duration.*10
Higher Education Institutions may in certain cases apply additional admission procedures.

8.8 National Sources of Information

- *Kultusministerkonferenz (KMK)* [Standing Conference of the Ministers of Education and Cultural Affairs of the *Länder* in the Federal Republic of Germany]; Graurheindorfer Str. 157, D-53117 Bonn; Phone: +49[0]228/501-0; www.kmk.org; E-Mail: hochschulen@kmk.org
- Central Office for Foreign Education (ZAB) as German NARIC; www.kmk.org; E-Mail: zab@kmk.org
- German information office of the *Länder* in the EURYDICE Network, providing the national dossier on the education system; www.kmk.org; E-Mail: Eurydice@kmk.org
- *Hochschulrektorenkonferenz (HRK)* [German Rectors' Conference]; Leipziger Platz 11, D-10117 Berlin, Phone: +49 30 206292-11; www.hrk.de; E-Mail: post@hrk.de
- "Higher Education Compass" of the German Rectors' Conference features comprehensive information on institutions, programmes of study, etc. (www.higher-education-compass.de)

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*1
The information covers only aspects directly relevant to purposes of the Diploma Supplement.

*2
Berufsakademien are not considered as Higher Education Institutions, they only exist in some of the *Länder*. They offer educational programmes in close cooperation with private companies. Students receive a formal degree and carry ou an apprenticeship at the company. Some *Berufsakademien* offer Bachelor courses which are recognised as an academic degree if they are accredited by the Accreditation Council.

*3
German Qualifications Framework for Higher Education Degrees. (Resolution of the Standing Conference of the Ministers of Education and Cultural Affairs of the *Lände* in the Federal Republic of Germany of 16 February 2017).

*4
German Qualifications Framework for Lifelong Learning (DQR). Joint resolution of the Standing Conference of the Ministers of Education and Cultural Affairs of the *Länder* in the Federal Republic of Germany, the German Federal Ministry of Education and Research, the German Conference of Economics Ministers and the German Federal Ministry of Economics and Technology (Resolution of the Standing Conference of the Ministers of Education and Cultural Affairs of the *Länder* in the Federal Republic of Germany of 15 November 2012). More information at www.dqr.de

*5
Recommendation of the European Parliament and the European Council on the establishment of a European Qualifications Framework for Lifelong Learning of 23 April 2008 (2008/C 111/01 - European Qualifications Framework for Lifelong Learning - EQF).

*6
Specimen decree pursuant to Article 4, paragraphs 1 - 4 of the interstate study accreditation treaty (Resolution of the Standing Conference of the Ministers of Education and Cultural Affairs of the Länder in the Federal Republic of Germany of 7 December 2017).

*7
Interstate Treaty on the organization of a joint accreditation system to ensure the quality of teaching and learning at German higher education institutions (Interstate study accreditation treaty) (Decision of the Standing Conference of the Ministers of Education and Cultural Affairs of the Länder in the Federal Republic of Germany of 8 December 2016), Enacted on 1 January 2018.

*8
See note No. 7.

*9
See note No. 7.

*10
Access to higher education for applicants with a vocational qualification, but without a school-based higher education entrance qualification (Resolution of the Standing Conference of the Ministers of Education and Cultural Affairs of the *Lände* in the Federal Republic of Germany of 6 March 2009).