Bachelorurkunde

Technology
Arts Sciences
TH Köln

Herr [redacted]
geboren am [redacted] **in** [redacted]
hat am 05.12.2016
die Bachelorprüfung in der Fachrichtung

Informatik
Studiengang Medieninformatik

mit Erfolg abgelegt. Aufgrund dieser Prüfung verleiht die Technische Hochschule Köln ihm den akademischen Grad

Bachelor of Science
B. Sc.

Der Studiengang wurde durch die Akkreditierungsagentur für Studiengänge der Ingenieurwissenschaften, der Informatik, der Naturwissenschaften und der Mathematik e.V. (ASIIN) akkreditiert.

Gummersbach, den 05.12.2016

Der Dekan
der Fakultät für
Informatik und
Ingenieurwissenschaften

Prof. Dr. Ch. Averkamp

Der Vorsitzende
des Prüfungsausschusses für die
Studiengänge der Fachrichtung
Informatik

Prof. Dr. S. Eckstein

Bachelorurkunde

Technology
Arts Sciences
TH Köln

(Prägesiegel)

Zeugnis

Technology
Arts Sciences
TH Köln

Fakultät für Informatik und Ingenieurwissenschaften
Studiengang Medieninformatik

Blatt 2 des Zeugnisses über die Bachelorprüfung vom 05.12.2016
für Herrn [redacted]

Thema der Bachelorarbeit:

Optimizing Reinforcement Learning using Genetic Algorithms

Note der Bachelorarbeit	**sehr gut**	**12**
Note des Kolloquium	**sehr gut**	**3**

Aus den Noten der Bachelorarbeit, des Kolloquiums und der während des Studiums abgelegten Modulprüfungen ist folgende Gesamtnote gebildet worden:

gut (2,0)	**180 Credits**

Gummersbach, den 05.12.2016

Der Vorsitzende des Prüfungsausschusses für die Studiengänge der Fachrichtung Informatik

(Siegel)

Prof. Dr. S. Eckstein

Die Prüfung erfolgte auf der Grundlage der Bachelorprüfungsordnung (BPO) für die Studiengänge Allgemeine Informatik, Medieninformatik, Technische Informatik und Wirtschaftsinformatik mit dem Abschlussgrad Bachelor of Science der Fachhochschule Köln, Campus Gummersbach vom 07. Januar 2011

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Die Gesamtnote der Bachelorprüfung wird aus dem mit den Leistungspunkten (165 Credits) gewichteten Durchschnitt der Modulprüfungen, der Bachelorarbeit (12 Credits) und des Kolloquiums (3 Credits) ermittelt.
Notenstufen: sehr gut, gut, befriedigend, ausreichend

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Fakultät für Informatik und Ingenieurwissenschaften
Studiengang Medieninformatik

Herr [redacted]
geboren am [redacted] in [redacted]
hat am 05.12.2016 die Bachelorprüfung abgelegt.

Noten und Credits der Modulprüfungen

Einführung in die Medieninformatik	**gut**	**5**
Einführung in Betriebssysteme und Rechnerarchitekturen	**befriedigend**	**5**
Algorithmen und Programmierung I	**gut**	**8**
Algorithmen und Programmierung II	**befriedigend**	**7**
Mathematik I	**befriedigend**	**7**
Mathematik II	**befriedigend**	**8**
Theoretische Informatik I, II	**sehr gut**	**10**
Grundlagen der visuellen Kommunikation	**gut**	**5**
Grundlagen BWL I	**befriedigend**	**5**
Grundlagen BWL II	**befriedigend**	**5**
Medientechnik und -produktion	**gut**	**5**
Audiovisuelles Medienprojekt	**gut**	**5**
Kommunikationstechnik und Netze	**befriedigend**	**5**

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Web-basierte Anwendungen 1: WWW Technologien	befriedigend	5
Computergrafik und Animation	befriedigend	5
Datenbanken I	sehr gut	5
Betriebssysteme und verteilte Systeme	sehr gut	5
Softwaretechnik	gut	5
Web-basierte Anwendungen 2: Verteilte Systeme	gut	5
Mensch-Computer Interaktion	sehr gut	5
Entwicklungsprojekt interaktive Systeme	befriedigend	10
Medien und Gesellschaft	gut	5
Projektmanagement	sehr gut	5
Querschnittsqualifikationen	gut	5
Praxisprojekt: Periculum - Ein Rahmenwerk zur Anwendung von Reinformcement Learning auf 2D Jump'n'Run Spiele	sehr gut	15
Virtuelle Realität	sehr gut	5
Spezielle Informationssysteme	gut	5

Gummersbach, den 05.12.2016

Der Vorsitzende
des Prüfungsausschusses für die
Studiengänge der Fachrichtung
Informatik

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Technology
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(Siegel)

Prof. Dr. S. Eckstein

Diploma Supplement

Technology
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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. HOLDER OF THE QUALIFICATION

1.1 Family Name / 1.2 First Name

[redacted]

1.3 Date, Place, Country of Birth

[redacted]

1.4 Student ID Number or Code

[redacted]

2. QUALIFICATION

2.1 Name of Qualification (full, abbreviated; in original language)
Bachelor of Science (B. Sc.)
Title Conferred (full, abbreviated; in original language)
same
2.2 Main Field(s) of Study
Media Informatics
2.3 Institution Awarding the Qualification (in original language)
Technische Hochschule Köln, Fakultät für Informatik und Ingenieurwissenschaften
Status (Type / Control)
University of Applied Sciences / State Institution
2.4 Institution Administering Studies (in original language)
same
Status (Type / Control)
same
2.5 Language(s) of Instruction/Examination
German

3. LEVEL OF THE QUALIFICATION

3.1 Level
Undergraduate degree; with Bachelor's Thesis
3.2 Official Length of Program
6 semesters (three years)
3.3 Access Requirements
Fachhochschulreife or equivalent; German language competence (DSH II) if secondary-school diploma was not obtained from a German institution.

4. CONTENTS AND RESULTS GAINED

4.1 Mode of Study
Fulltime
4.2 Program Requirements/Qualification Profile of the Graduate

Graduates of the Bachelor's program in Media Informatics will attain profound knowledge and understanding of the general principles of informatics and of media informatics in particular. They will be proficient in analytical thinking and problem solving, will be able to abstract, create real-world problems, develop models, distinguish between model and reality, evaluate models and act in formal domains.

Graduates will be capable of solving problems in the field of media informatics, which is oftentimes an ill-defined or incomplete academic field and is often prioritized differently by different stakeholders. Students will learn how to formulate, formalize and solve problems and create new or emerging topics within the field of media informatics.

Students will be able to analyze problems related to the conceptualization of media-based IT-systems, they will develop basic competencies in media design and learn to select appropriate media in terms of communicational objectives. They will be able to derive from and specify organizational, social and cultural contexts, limitations and rules and will be capable of formulating design objectives by taking different points of view into account.

In addition, students will be made familiar with design dimensions and features and will obtain an active vocabulary for the description and implementation of media-based systems. They will be able to incorporate knowledge from different disciplines (such as informatics, related sciences and, for example, economics) into their studies and deal with complexities. They will acquire the skills necessary to make decisions based on methodological considerations and to select and execute method-based techniques properly. Students will be able to acknowledge problems related to media informatics from an economic perspective and know how to solve these problems accordingly. They will be capable of recognizing and applying design patterns (in terms of algorithms, usage, architecture and user interfaces). Students will master methods and techniques in the field of media informatics and related disciplines. They will learn to familiarize themselves with new topics and apply newly-acquired knowledge efficiently to develop solutions, and will be capable of familiarizing themselves with – as far as informatics is concerned – unrelated topics and methods.

CUAS graduates will have acquired life-long learning capacities.

Moreover, graduates will be aware of the advantages, risks, constraints and legal restrictions of the use of IT-systems and will be able to efficiently communicate in teams. They will attain knowledge of cultural contexts and will moreover be able to integrate these contexts and their knowledge of ethical concepts into their academic and professional behavior.

4.3 Program Details

See *Prüfungszeugnis* (Bachelor Examination Certificate) for a list of courses and grades as well as topic of the thesis, including grades.

4.4 Grading Scheme

Grades are assigned as set down in the general grading scheme cf. Sec. 8.6.
December 05, 2016
up to 1.5 = excellent
above 1.5 – 2.5 = good
above 2.5 – 3.5 = satisfactory
above 3.5 – 4.0 = sufficient
above 4.0 = fail
The final cumulative grade point average is determined by the weighted grades for the Bachelor's Thesis and the examination grade average. Credits are assigned according to ECTS-standards (European Credit Transfer System).

4.5 Overall Classification (in original language)

2,0 (gut)

5. FUNCTION OF THE QUALIFICATION

5.1 Access to Further Study

Graduates of the Bachelor's program in Media Informatics are eligible for second-cycle university studies. A second-cycle university degree is comprised of at least 120 credits (two years of full-time study). Programs leading to second-cycle university degrees, which are geared towards foreign students, require a minimum of 90 credits. The second-cycle university degree is usually a Master of Science (e.g. in informatics or computer science).

5.2 Professional Status

The Bachelor's Degree in Media Informatics entitles its holders to exercise professional work in the fields of media informatics, informatics and related fields in industry as well as in public institutions.

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6. ADDITIONAL INFORMATION

6.1 Additional Information:

The Bachelor's program was accredited on March 30, 2010 and April 01, 2011.

6.2 Further Information Sources

For detailed information on undergraduate studies (Bachelor's program) in Media Informatics at Cologne University of Applied Sciences, please visit:

www.gm.th-koeln.de/studium/studienangebot/inf/mi/

7. CERTIFICATION

This Diploma Supplement is in reference to the following original documents:
Urkunde über die Verleihung des Grades **December 05, 2016**
Prüfungszeugnis **December 05, 2016**
Transcript of Records

Date of certification: December 05, 2016

(Official stamp/seal)

Chairman of the Examination Board
(Prof. Dr. S. Eckstein)

8. NATIONAL HIGHER EDUCATION SYSTEM
The information on the national higher education system on the following pages provides details about the qualification and the types of institutions that award it.

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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 (Universities of Applied Sciences) 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 a distinct application-oriented focus and professional character of studies, which include 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, a scheme of first- and second-level degree programmes (Bachelor and Master) was introduced to be offered parallel to or instead of integrated "long" programmes. These programmes are designed to provide enlarged variety and flexibility to students in planning and pursuing educational objectives, they also enhance international compatibility of studies.

The German Qualification Framework for Higher Education Degrees[3] describes the degrees of the German Higher Education System. It contains the classification of the qualification levels as well as the resulting qualifications and competencies of the graduates.

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).[4] In 1999, a system of accreditation for programmes of study has become operational under the control of an Accreditation Council at national level. All new programmes have to be accredited under this scheme; after a successful accreditation they receive the quality-label of the Accreditation Council.[5]

8.4 Organization and Structure of Studies

The following programmes apply to all three types of institutions. Bachelor's and Master's study courses 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 degree study programmes lay the academic foundations, provide methodological skills and lead to qualifications related to the professional field. The Bachelor degree is awarded after 3 to 4 years.
The Bachelor degree programme includes a thesis requirement. Study courses leading to the Bachelor degree must be accredited according to the Law establishing a Foundation for the Accreditation of Study Programmes in Germany.[6]
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.).

8.4.2 Master

Master is the second degree after another 1 to 2 years. Master study programmes may be differentiated by the profile types "practice-oriented" and "research-oriented". Higher Education Institutions define the profile.
The Master degree study programme includes a thesis requirement. Study programmes leading to the Master degree must be accredited according to the Law establishing a Foundation for the Accreditation of Study Programmes in Germany.[7]
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 study programmes which are designed for continuing education may carry other designations (e.g. MBA).

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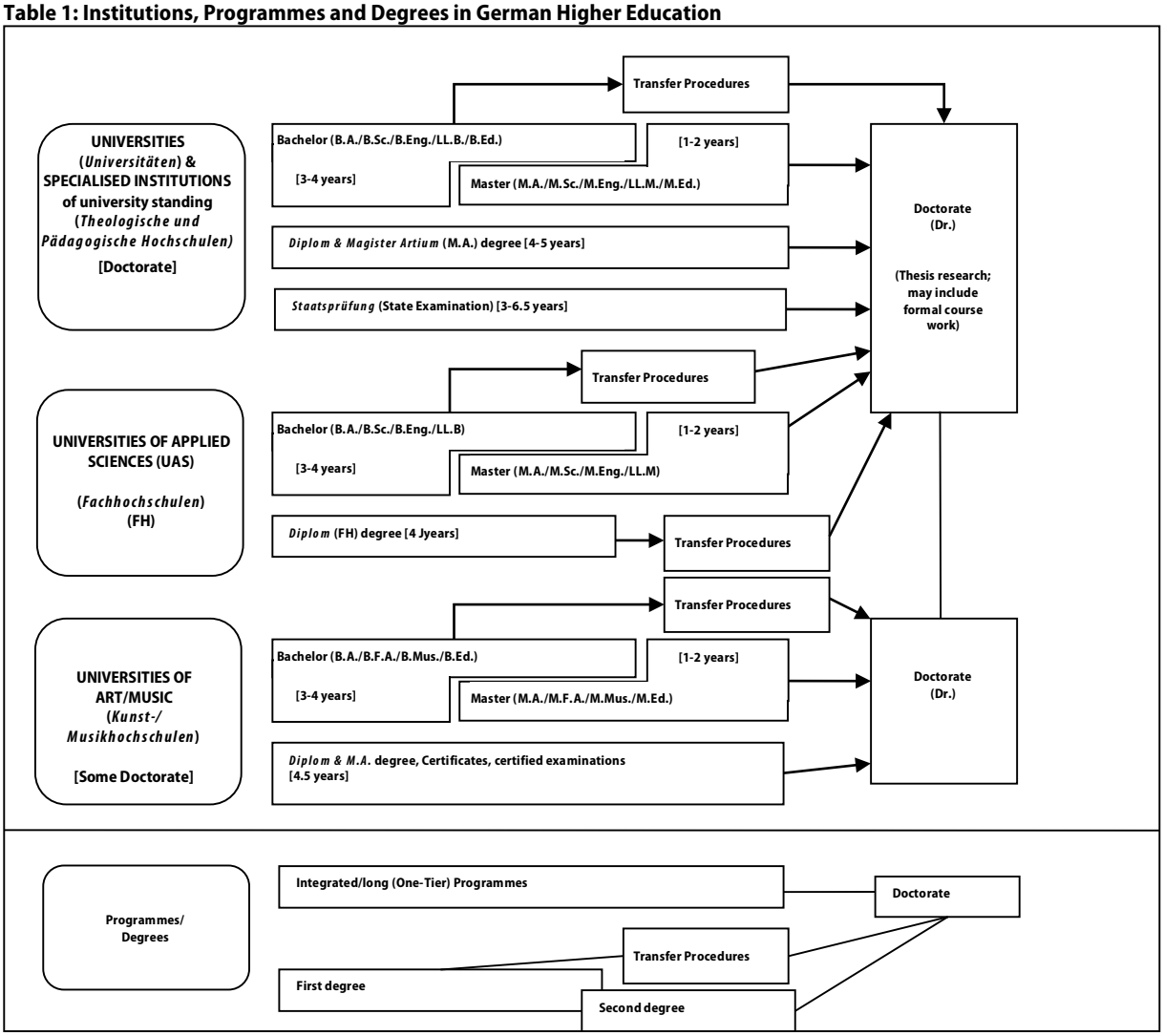
Table 1: Institutions, Programmes and Degrees in German Higher Education



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

An integrated study programme is either mono-disciplinary (*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 specializations. 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 level.

- Integrated studies at *Universitäten (U)* last 4 to 5 years (*Diplom* degree, *Magister Artium*) or 3 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. 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)*/Universities of Applied Sciences (UAS) last 4 years and lead to a *Diplom (FH)* degree. While the *FH*/UAS are non-doctorate granting

institutions, qualified graduates 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 organization, depending on the field and individual objectives. In addition to *Diplom/Magister* degrees, the integrated study programme awards include Certificates and certified examinations for specialized areas and professional purposes.

8.5 Doctorate

Universities as well as specialized institutions of university standing and some Universities of Art/Music are doctorate-granting institutions. Formal prerequisite for admission to doctoral work is a qualified Master (UAS and U), a *Magister* degree, a *Diplom*, a *Staatsprüfung*, or a foreign equivalent. Particularly qualified holders of a Bachelor 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.

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 institutions partly already use an ECTS grading scheme.

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 to particular disciplines. Access to *Fachhochschulen* (UAS) is also possible with a *Fachhochschulreife*, which can usually be acquired after 12 years of schooling. Admission to Universities of Art/Music may be based on other or require additional evidence demonstrating individual aptitude. 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]; Lennéstrasse 6, D-53113 Bonn; Fax: +49[0]228/501-229; Phone: +49[0]228/501-0
- Central Office for Foreign Education (ZaB) as German NARIC; www.kmk.org; E-Mail: zab@kmk.org
- "Documentation and Educational Information Service" as German EURYDICE-Unit, providing the national dossier on the education system (http://www.kmk.org/dokumentation/zusammenarbeit-auf-europaeischer-ebene-im-eurydice-informationsnetz.html; E-Mail: eurydice@kmk.org)
- *Hochschulrektorenkonferenz (HRK)* [German Rectors' Conference]; Ahrstrasse 39, D-53175 Bonn; Fax: +49[0]228/887-110; Phone: +49[0]228/887-0; 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. All information as of 1 July 2010.

[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 out an apprenticeship at the company. Some *Berufsakademien* offer Bachelor courses which are recognized as an academic degree if they are accredited by a German accreditation agency.

[3] German Qualification Framework for Higher Education Degrees (Resolution of the Standing Conference of the Ministers of Education and Cultural Affairs of the *Länder* in the Federal Republic of Germany of 21.04.2005).

[4] Common structural guidelines of the *Länder* for the accreditation of Bachelor's and Master's study courses (Resolution of the Standing Conference of the Ministers of Education and Cultural Affairs of the *Länder* in the Federal Republic of Germany of 10.10.2003, as amended on 04.02.2010).

[5] "Law establishing a Foundation 'Foundation for the Accreditation of Study Programmes in Germany'", entered into force as from 26.2.2005, GV. NRW. 2005, nr. 5, p. 45 in connection with the Declaration of the *Länder* to the Foundation "Foundation: Foundation for the Accreditation of Study Programmes in Germany" (Resolution of the Standing Conference of the Ministers of Education and Cultural Affairs of the *Länder* in the Federal Republic of Germany of 16.12.2004.

[6] See note No. 5.

[7] See note No. 5.