

Diploma Supplement

Master Internet-Sicherheit

Internet Security

Matrikelnummer

This Diploma Supplement follows the model 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 is free from any value judgements, equivalence statements or suggestions about recognition. Information in all eight sections is provided. Where information is not provided, an explanation gives the reason why.

1. Holder of the Qualification

1.1	Family Name	XXX
1.2	First Name	XXX
1.3	Date, Place, Country of Birth	XXX XXX XXX
1.4	Student ID Number or Code	XXX

2. Qualification

2.1	Name of Qualification	Master of Science
	full	Master of Science
	abbreviated	M.Sc.
	in original language	Master of Science
	Title Conferred	
	full	n.a.
	abbreviated	n.a.
	in original language	n.a.
2.2	Main Field(s) of Study	Internet Security
2.3	Institution Awarding the Qualification (in original language)	Westfälische Hochschule Fachbereich Informatik und Kommunikation
	Status (Type / Control)	University of Applied Sciences / State Institution
2.4	Institution Administering Studies	Westfälische Hochschule Department of Computer Science and Communications
	Status (Type / Control)	University of Applied Science / State Institution
2.5	Language(s) of Instruction/ Examination	German

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3. Level of the Qualification

- | | | |
|-----|------------------------------|--|
| 3.1 | Level | Graduate Degree (two years, 120 credits): eleven compulsory modules (78 credits) and two compulsory electives modules (12 credits) and thesis (30 credits) |
| 3.2 | Official Length of Programme | Two years (120 credits) |
| 3.3 | Access Requirements | Access to the M.Sc. program requires a level of university studies comparable to an international Bachelor's degree standard with a grade of 2.5 or better. The program is suitable for applicants holding an undergraduate degree in information technology or computer science. This includes the branches applied computer science, technical computer science and computer science and media. Applicants holding a degree in commercial information technology, media technology or communications engineering are also admitted, if the amount of contents related to the field of computer science is at least 60%. If the computer science related contents range below 60% or if the applicant owns a degree in engineering, mathematics, economics or media design, the applicant's qualifications are individually checked and grand admission on condition of the completion of bridging modules from the B.Sc. program if necessary. |

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4. Contents and Results Gained

4.1 Mode of Study Full-time

4.2 Programme Requirements

Building on the first university degree, the Master's degree in internet security leads to the expansion and deepening of professional and methodological-analytical competencies. Students will be taught not only the knowledge and understanding of the general principles of computer science, but also, in particular, specific knowledge of Internet security. The formal, algorithmic, and mathematical competencies that graduates are learning also includes a critical awareness of recent findings in Internet security, their data protection and ethical aspects. In the area of analysis, design and implementation competence, graduates have the ability to use innovative methods and knowledge to solve unknown, complex problems from the current context of Internet security, and to evaluate and process incomplete or contradictory information with their judgment. Graduates also learn the ability to abstract from concrete individual cases to solutions for a variety of problems. They can use their knowledge and understanding of the structure, principles, architecture and functioning of security components and systems to take appropriate counter-measures for attacks on the Internet infrastructure, and Internet security systems and processes to protect sensitive data design. As a matter of fact, graduates are able to combine knowledge from different fields in order to identify future problems, technologies and developments and to incorporate them into their work. In this way, graduates are enabled to make their own contribution to the further development of the Internet culture and in this way can contribute to a higher level of confidentiality and security on the Internet. The improvement of the innovation climate in the area of the Internet and the offered services is thereby encouraged. The technological skills are mainly in the field of Internet technologies, distributed systems, network and computer security, service security (cloud computing, software as a service, Internet 4.0, etc.) and Internet analysis. Graduates acquire a basic understanding of security technologies used in web and communications applications, operating systems, or networks, as well as the ability to handle Internet analysis and early warning systems. In addition, they are able to classify the security problems at different levels of the ISO / OSI reference model and are familiar with the current Internet standards and their potential to ward off potential dangers. The graduates gain deep expertise in the field of Internet security, which is always based on current developments and the latest state of science and technology. The graduates' knowledge of the technology reaches to the top of the technology, but they also learn about the limitations of current techniques and the social impact of their practical work. In addition to the above-described specialist training, graduates are able to expand their interdisciplinary skills through the application-oriented character of the master's program and the project work. Graduates deepen their communication skills by working in small project teams, learn the techniques for presenting new insights, and build their abilities for self-responsible scientific work. Communicative responsibility for results and their accountability is promoted in all study sections and suitable events. In this way, the graduates acquire job-specific key qualifications, the ability to cooperate with non-specialist partners, and address the challenges of science, thereby preparing them for their constructive participation in the innovation process and acquiring the project management competence to assume a leading position in development and project implementation. The graduates are able to perform independent tasks and challenging tasks in science, industry and administration, and to deal with complex problems. They also fulfill the prerequisites for carrying out a doctorate in their specialty.

4.3 Programme Details See Transcript for list of courses and grades
See "Prüfungszeugnis" (Final Examination Certificate) for subjects offered in final examinations and topic of thesis, including evaluations.

4.4 Grading Scheme General grading scheme cf. Sec. 8.6.
ECTS Grade:

4.5 Overall Classification (in original language) **Note**

Studies grade is accumulated according to the number of credit points of each module including MA thesis.

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5 Function of the Qualification

- | | | |
|-----|-------------------------|--|
| 5.1 | Access to Further Study | Qualifies to apply for admission for doctoral work (thesis research) with specific additional requirements which may differ from institution to institution. |
| 5.2 | Professional Status | Makes its holder eligible for a superior career in the public service (so called Höherer Dienst) in Germany. |

6. Additional Information

- | | | |
|-----|-----------------------------|--|
| 6.1 | Additional Information | The study programme Master of Science has been accredited by the Fachakkreditierungsagentur für Studiengänge der Ingenieurwissenschaften, der Informatik, der Naturwissenschaften und der Mathematik e.V. (ASIIN) in 2005. |
| 6.2 | Further Information Sources | on the institution: http://www.w-hs.de
for national information sources cf. Sec. 8. |

7. Certification

This Diploma Supplement refers to the following original documents:

- Urkunde über die Verleihung des Master of Science XXX
- Prüfungszeugnis XXX

Certification Date:

XXX

[Official Stamp/Seal]

Prof. Dr. Marcel Luis
Head of the Examination Board

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.

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8. INFORMATION ON THE GERMAN HIGHER EDUCATION SYSTEM¹

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.

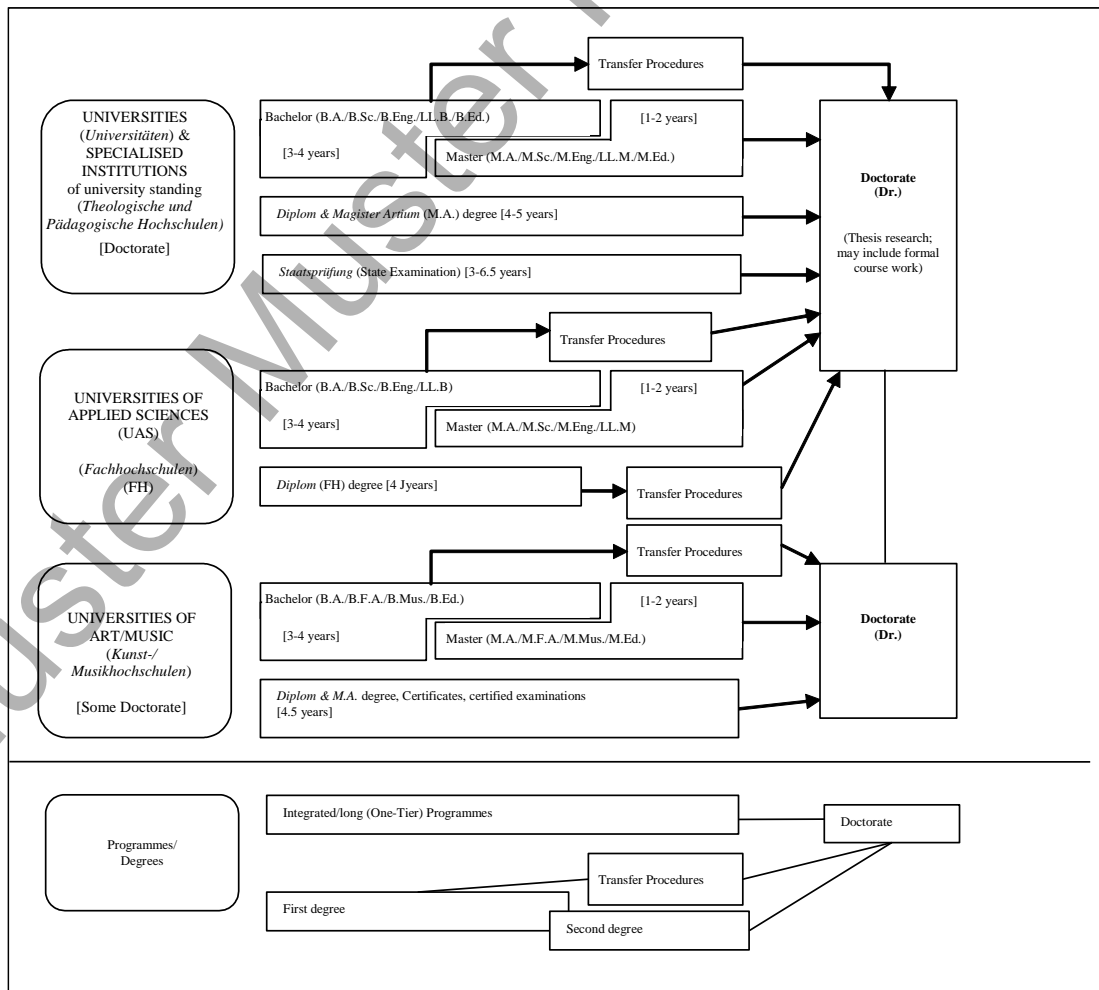
The German Qualification Framework for Higher Education Degrees³ describes the degrees of the German Higher Education System. It contains the classification of the qualification levels as well as the resulting qualifications and competencies of the graduates.

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

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 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 must be differentiated by the profile types "more practice-oriented" and "more research-oriented". Higher Education Institutions define the profile of each Master study programme.

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 (LL.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 or which do not build on the preceding Bachelor study programmes in terms of their content, may carry other designations (e.g. MBA).

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, pharmaceutical and teaching professions are completed by a *Staatsprüfung*. 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- und 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 may already use the ECTS grading scheme, which operates with the levels A (best 10 %), B (next 25 %), C (next 30 %), D (next 25 %), and E (next 10 %).

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 (*Fachgebundene 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 (www.kmk.org/doku/bildungswesen.htm; E-Mail: eurydice@kmk.org)

- *Hochschulrektorenkonferenz (HRK)* [German Rectors' Conference]; Ahhrstrasse 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)

Clause 2 of the Framework Act for Higher Education (HRG) 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 October 2003, as amended on 18 September 2008).

⁵ "Law establishing a Foundation "Foundation for the Accreditation of Study Programmes in Germany", entered into force as from 26 February 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 16.2.2004.

⁶ See note No. 5.

⁷ See note No. 5.

¹ The information covers only aspects directly relevant to purposes of the Diploma Supplement. All information as of 1 December 2008.

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 April 2005).

⁴ Common structural guidelines of the *Länder* as set out in Article 9