

# Diploma Supplement

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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's information and pertinent data to improve the international 'transferability and fair recognition' of professional, academic 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. For use in international contexts 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

**Mustermann, Hans**

### 1.3 Date, Place, Country of Birth

**1974-06-23, Musterhausen**

### 1.4 Student ID Number or Code

**7971**

## 2. QUALIFICATION

### 2.1 Name of Qualification (full, abbreviated; in original language)

**+49 3943 659 300**

Title Conferred (full, abbreviated; in original language)

**Does not apply**

### 2.2 Main Field(s) of Study

**Automation Systems and Computational Engineering with the field of study Computational Engineering with the specializations:**

- **Distributed Real-Time Data processing**
- **Factory Automation**
- **Autonomous Mobile Systems**

### 2.3 Institution Awarding the Qualification (in original language)

**Hochschule Harz - Hochschule für angewandte Wissenschaften (FH)**

Status (Type / Control)

**University of Applied Sciences / State University**

### 2.4 Institution Administering Studies (in original language)

**Hochschule Harz - Hochschule für angewandte Wissenschaften (FH)**

Status (Type / Control)

**University of Applied Sciences / State University**

### 2.5 Language(s) of Instruction/Examination

**German and English**

### 3. LEVEL OF THE QUALIFICATION

#### 3.1 Level

**graduate / first professional qualifying degree with degree thesis**

#### 3.2 Official Length of Programme

**3.5 years with 7 semesters**

#### 3.3 Access Requirements

**Before beginning the studies, one of the following conditions for admission must be fulfilled:**

- **General Higher Education Entrance Qualification**
- **Specialised Higher Education Entrance Qualification**
- **General Higher Education Entrance Qualification for Universities of Applied Sciences**
- **University Administered Entrance Exam**
- **A qualification for entrance to higher education deemed equivalent by the Land Saxony-Anhalt.**

### 4. CONTENTS AND RESULTS GAINED

#### 4.1 Mode of Study

**Full-time, on-campus programme**

#### 4.2 Programme Requirements/Qualification Profile of the Graduate

**The Bachelor course of studies, "Automation Systems and Computational Engineering", has 2 main fields of studies and has the goal of imparting to the graduates specific specialized competencies that are appropriate for distributed automation systems and for the application of computer technologies, qualifying them for a successful career in development and production enterprises.**

**This course of studies conveys essential key qualifications and language skills in english. The graduate has demonstrated a wide and integrated knowledge and understanding of the scientific fundamentals of his area of study. He possess a critical understanding of the most important theories, principles and methods of his study program, and is able to deepen his theoretical knowledge and practical abilities.**

**The field of study Computational Engineering concentrates on topics of the application of computer science to complex distributed automation systems.**

**In detail, the graduate of field of study Computational Engineering has acquired the following competencies:**

##### **Instrumental Competency:**

- **Ability to apply his knowledge and understanding to the field of applied informatics to distributed automation systems and**
- **Ability to solve problems and enhance solutions**

##### **Systemic Competencies**

- **Ability to gather, evaluate and interpret relevant information relating to application of information technologies to automation systems;**
- **Ability to derive scientifically sound judgements from that information, which take into account social, scientific and ethical knowledge;**
- **apply concepts of computer science to solve problems for data acquisition, data processing, data communication, information management and visualisation of plant information in complex automation systems;**
- **fulfil systematically all tasks related to the complete software engineering process;**
- **Ability to independently design post graduate learning processes**

##### **Communicative Competencies**

- **is able to formulate, argue, and defend positions and solutions to problems**

- related to automation systems and the application of computer science;
- can exchange information, ideas, problems, and solutions with specialists and lay persons;
- can assume responsibility in a team.

The graduates of the field of study Computational Engineering acquired professional competencies in the areas of applied informatics, internet technologies for complex automation systems. They have profound knowledge in process control systems, measurement, Programmable Logic Controllers (PLC), and automatic control. They have basic knowledge in the field of economics. He is able to develop end enhance hardware and software components, and integrate them into IT infrastructures.

Following specialisation allow to develop extended knowledge and skills in typical areas of application:

**Distributed Real-Time Data processing:**

The graduate knows the architecture of microcontrollers and digital signal processors (DSP) and is able to program these kinds of computer systems. He is able to develop software with higher programming languages on real-time operating systems, and for embedded systems with limited hardware resources.

**Factory Automation:**

The graduate knows comprehensive process control systems an can adapt it to specific needs and circumstances. He has an overview of concepts of manufacturing execution systems (MES). He is able to apply computer based methods and tools to design and visualise complex automation systems and to implement applications based on typical communication services in process control systems.

**Autonomous Mobile Systems:**

The graduate knows the fundamentals to the programming of mobile terminals. He owns the skills to the programming of autonomous robots and vehicles.

#### 4.3 Programme Details

Courses Taken	Grade	Performance Appraisal	ECTS-Credits	ECTS-Grade
Mathematics I	3,1	satisfactory	10	*
Physics I	3,2	satisfactory	5	*
Electrical Engineering I	1,6	good	5	*
Introduction to Computer Science	3,3	satisfactory	2,5	*
Fundamentals of Engineer's Technology	1,2	very good	5	*
Programme and Data Structures	1,7	good		*
Mathematics II	3,9	sufficient	10	*
Physics II	3,5	satisfactory	5	*
Electrical Engineering II	1,7	good	5	*
Digital Fundamentals	1,6	good	5	*
Technical English	1,7	good	5	*
AC Technology	3,8	sufficient	5	*
Microcomputer Structures	1,8	good	5	*
Communication Technology	1,8	good	5	*
Electric Measuring Technology	3,1	satisfactory	5	*
Algorithms	3	satisfactory		*
Bus Systems and Computer Networks	3,3	satisfactory	2,5	*
Industrial Control	3,3	satisfactory	5	*

Automatic Control	3,5	satisfactory	5	*
Process Control	3,2	satisfactory	5	*
Sensors and Actuators	3,7	sufficient	2,5	*
Object-oriented Programming	1,7	good	5	*
Introduction to Business Administration	2,1	good	2,5	*
Operating Systems and Graphical User Interfaces	2,7	satisfactory	5	*
Quality Management	2,1	good	2,5	*
Software Technology	1,6	good	5	*
Computer Communications	2,7	satisfactory	5	*
Theoretical Computer Science	2,9	satisfactory	2,5	*
Electives	1,4	very good	5	*
Team Project	1,2	very good	5	*
Database Systems	2,9	satisfactory	5	*
Project	3,5	satisfactory	7,5	*
Factory Automation	2,9	satisfactory		*
Autonomous Mobile Systems	2,3	good		*
Distributed Real-Time Data Processing	1,6	good		*
Work Placement	2,5	good	15	*
Colloquium	3,9	sufficient	3	*
Bachelor Thesis	3,3	satisfactory	12	*
Theme:	Hier steht dann der Titel der Bachelor- bzw. Masterarbeit in englisch, soweit vorhanden, sonst in deutsch			

\* Not calculated due to an inadequate number of cases.

#### 4.4 Grading Scheme

HS Harz Grade	Performance appraisal
1,0 - 1,3	Very good
1,7 - 2,0 - 2,3	Good
2,7 - 3,0 - 3,3	Satisfactory
3,7 - 4,0	Sufficient
5,0	Non-sufficient/Fail

The calculation of the ECTS-grade results from an examination cohort of the three preceding semesters. In order to be calculated, the ECTS-grade requires at least 20 examination events in the examination cohort.

See below section 8.6

#### 4.5 Overall Classification (in original language)

**2,2 (good)**

**ECTS-Grade: C**

## 5. FUNCTION OF THE QUALIFICATION

### 5.1 Access to Further Study

**The graduate of the field of study Computational Engineering has attained the ability to study further in programs at the level of a Master's degree. Due to his / her comprehensive interdisciplinary education in applied informatics and electrical engineering studies, he / she can be recommended for the admission to applied computer science courses of study as well as to master degree programs with a main focus on automation systems.**

### 5.2 Professional Status

**Does not apply**

## 6. ADDITIONAL INFORMATION

### 6.1 Additional Information

**The graduate has proved extracurricular achievements.**

### 6.2 Further Information Sources

**[www.hs-harz.de/studium/fb-automatisierung-und-informatik/automatisierungstechnik-und-ingenieur-informatik/](http://www.hs-harz.de/studium/fb-automatisierung-und-informatik/automatisierungstechnik-und-ingenieur-informatik/)  
**+49 3943 659 300****

## 7. CERTIFICATION

This Diploma Supplement refers to the following original documents:

**Document of the granting of the degree dated 2014-03-31**

Urkunde über die Verleihung des Grades vom 31.03.2014

**Examination Certificate dated 2014-03-31**

Zeugnis vom 31.03.2014

**Transcript of Records dated 2014-03-31**

Transcript of Records vom 31.03.2014

**Certification Date: 2014-03-31**

**Musterdruck  
aus LSF-Daten**

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Chairman Examination Committee

University Seal

## 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.

**8. INFORMATION ON THE GERMAN HIGHER EDUCATION SYSTEM<sup>1</sup>**

**8.1 Types of Institutions and Institutional Status**

Higher education (HE) studies in Germany are offered at three types of Higher Education Institutions (HEI).<sup>2</sup>

- *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.

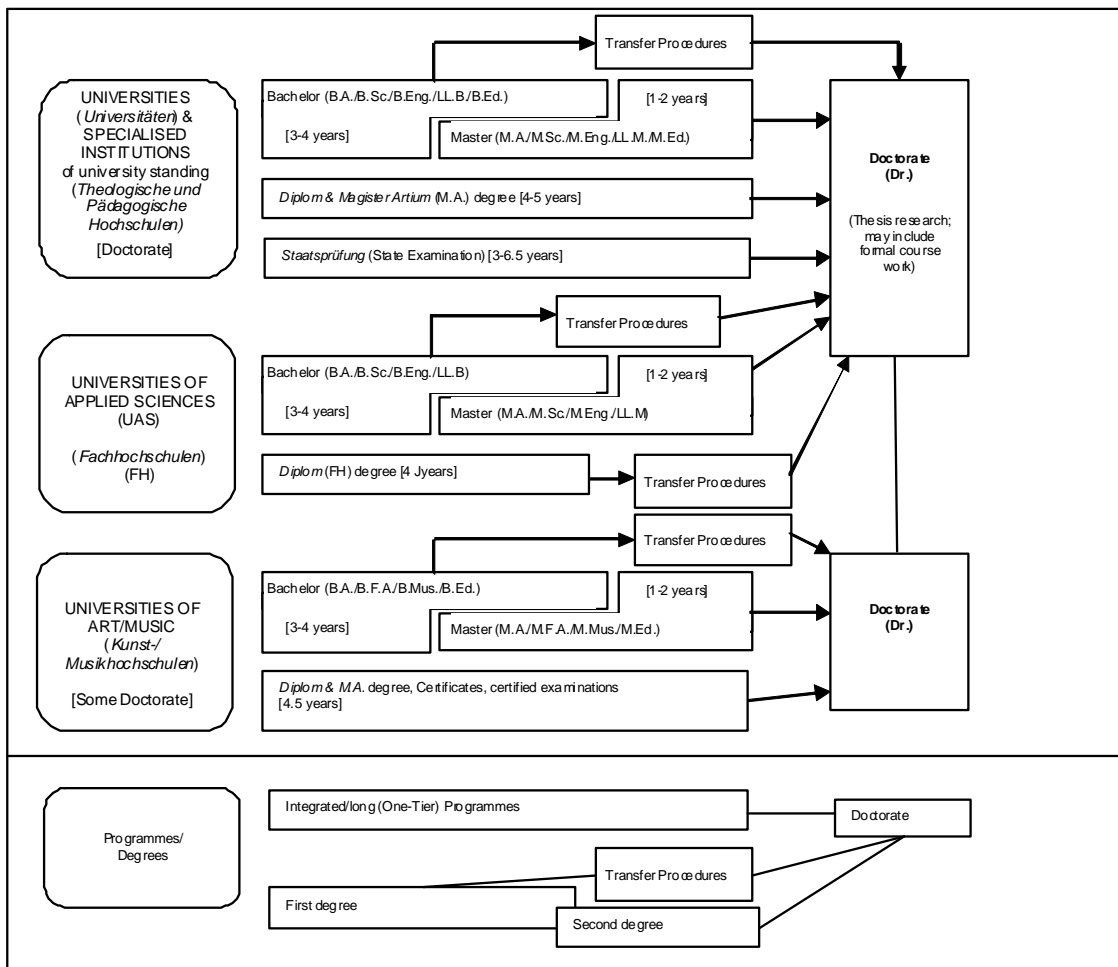
The German Qualification Framework for Higher Education Degree<sup>3</sup> describes the degrees of the German Higher Education System. It contains the classification of the qualification levels as well as the resulting qualifications and competencies of the graduates.

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).<sup>4</sup> 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.<sup>5</sup>

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



#### 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.<sup>6</sup>

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.<sup>7</sup>

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).

##### 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 (*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 EUR YDICE-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]; Ahnrstrasse 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](http://www.higher-education-compass.de))

<sup>1</sup> The information covers only aspects directly relevant to purposes of the Diploma Supplement. All information as of 1 July 2010.

<sup>2</sup> *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.

<sup>3</sup> 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).

<sup>4</sup> 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).

<sup>5</sup> "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 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).

<sup>6</sup> See note No. 5.

<sup>7</sup> See note No. 5.