Diploma Supplement

The function of this Diploma Supplement is to elaborate on the information provided by the Bachelor-Urkunde (graduation certificate) and the Bachelor-Zeugnis (transcript) awarded by Hochschule Mannheim / Mannheim University of Applied Sciences. The contents conform to the standard given by the Hochschulrektorenkonferenz (HRK), the association of state and state-recognised universities and other higher education institutions in Germany.

1. HOLDER OF THE QUALIFICATION

The holder of the qualification is shown on the Bachelor-Zeugnis.

2. QUALIFICATION

Name of Qualification: Bachelor of Science (B.Sc.)
Main Field(s) of Study: Electrical engineering and information technology with education (introduction to teaching these subjects at institutions of vocational training / Berufliche Schulen)
Institution Awarding the Qualification: Hochschule Mannheim / Mannheim University of Applied Sciences
Pädagogische Hochschule Heidelberg / University of Education
Status: University of Applied Sciences (Fachhochschule)
University of Education (Pädagogische Hochschule)
Institution Administering Studies: Hochschule Mannheim – Fakultät für Elektrotechnik
Pädagogische Hochschule Heidelberg / Fakultät für Natur- und Gesellschaftswissenschaften (Fakultät III)
Status: [same / same]
Languages of Instruction/Examination: German

3. LEVEL OF THE QUALIFICATION

Level
Bachelor graduate, first degree (3½ years) with research project
Official Length of Programme
3½ years including 3-month research project
Access Requirements
- University entry qualification or equivalent
- Non-German speaking students who are eligible to attend university in their home country are admitted according to German regulations

4. CONTENTS AND RESULTS GAINED

Mode of Study
Full-time attendance course; sandwich course
Programme Requirements / Qualification Profile of the Graduate

The programme is structured into a two-semester foundation course and five-semester main study programme including a work experience semester and the Bachelor thesis.

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<th>7th Semester</th>
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<tr>
<td>incl. Bachelor Thesis</td>
<td>Main Study</td>
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<td>60 Credits</td>
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The B.Sc. degree course aims to produce engineers with a firm grounding in fundamental electrical engineering and information technology who are able to deal with a wide range of material from microelectronics to heavy electrical plant, and to teach students technology-related subjects in vocational training. The aims of the course include:

- Equipping students with concepts, principles and knowledge of mathematics, science, engineering and information technology necessary to provide the intellectual toolkit required to employ future scientific and technological developments.
- Encouraging students to develop an engineering and/or systems approach to their thinking and develop problem-solving skills appropriate to a range of professional engineering situations.
- Providing opportunities to study in key engineering topics, through group and individual learning, and to develop appropriate transferable and interpersonal skills including the ability to maintain and enhance personal competence.
- Raising the awareness of the professional and ethical responsibilities of engineers.
- Introducing students to fundamental concepts of education, instructional psychology, and to teaching and learning technology-related subjects in a classroom environment.

Taught modules are:

- Calculus; Multivariable Calculus and Series; Mechanics and Vibrations; Thermodynamics and Waves; Analysis of Electric DC- and AC-Circuits; Single and Polyphase Systems; Electric and Magnetic Fields; Digital Technology; Semiconductor Circuits and Signal Amplifiers; Programming in C; Introduction to Object-Oriented Programming in C++; Differential Equations, Linear Algebra, Numerical Analysis; Mathematical Description of Continuous and Discrete Systems; Electrical Measurement and Instrumentation; Hardware Oriented Programming of Microcomputers; Microelectronics; Basics of Power Electronics; DC- and Three-phase AC-Machines; Electrical Drive Engineering; Introduction to Feedback Control; Digital Feedback Control Systems; Transmission and Distribution of Electrical Energy; High Voltage Technology, Basics and Applications; System and Program Design of Programmable Controls; Industrial Data Communication;
- Two core-option modules to be chosen from a range of electrical engineering and information technology subjects;
- Introduction to Psychology; Introduction to Teaching and Learning Technology-related Subjects; Teaching and Class Management; one core-option module to be chosen from a range of educational science subjects;
- Student Research Project (Studienarbeit); Research Project Seminar;
Professional practice experience module (Practical Semester)
- Industrial placement (18 weeks)
- Teaching practice at a vocational school (2 weeks)
- Seminar Key Skills
- Documentation and Reflection of Teaching Unit

Undergraduate dissertation with viva
- B.Sc. Dissertation with viva voce examination

Programme Components and Details
The programme components and details are listed on the back side of the Bachelor-Zeugnis. The English translation can be found on the transcript.

Grading Scheme
Grading system: 1.0 – 1.2 (distinction); 1.3 – 1.5 (very good); 1.6 – 2.5 (good); 2.6 – 3.5 (satisfactory); 3.6 – 4.0 (sufficient); 4.1 – 5.0 (fail).
In some courses only a pass or fail are awarded.

Overall Classification
The overall classification is shown on the Bachelor-Zeugnis. It is based on written assessments every semester during main study and a Bachelor thesis.
The course grades and the Bachelor thesis are weighted to calculate the final grade.
The course grades for the basic study are shown in a separated transcript called the Bachelorvorprüfungs-Zeugnis.

5. FUNCTION OF THE QUALIFICATION

Access to Further Study
The degree corresponds to the first cycle degree according to the new European Higher Education System (Bologna Declaration) and qualifies the holder to apply for a second cycle degree.

6. ADDITIONAL INFORMATION

Further Information Sources
a) on the institution, the department, the programme and the accreditation: www.hs-mannheim.de
b) description of course contents available on request
c) for national information sources cf. sect. 8.8

7. CERTIFICATION

This diploma supplement refers to the following original documents, issued by Hochschule Mannheim

Bachelor-Urkunde (graduation certificate)
Bachelor-Zeugnis (transcript)
8. INFORMATION ON THE GERMAN HIGHER EDUCATION SYSTEM

8.1 Types of Institutions and Institutional Status

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

- Universität (University) including various specialized institutions, offers 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.

- Kunsthochschulen (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 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 Staatliche Untersuchung der Künstler und Künstlerinnen des Landes in the Federal Republic of Germany (KKMK). In 1995, 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.

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 are accredited according to the Law establishing a Foundation for the Accreditation of Study Programmes in Germany.

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.

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 fields of study. An Intermediate Examination (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 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 Universität (U) last 4 to 5 years (Diplom degree, Magister Artium) or 3 to 3.5 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 Zwischenprüfung. This applies also to studies preparing for teaching professions of some Länder.
- Integrated studies at Fachhochschulen (FH)Universities of Applied Sciences (UAS) last 4 years and lead to a Diplom (FH) degree. While the FHUAS 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 Musikschulen (Universities of Art/Music etc.) are more diverse in their organization, depending on the field and individual objectives. In addition to Diplom/Musik 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 of the universities of Art/Music are doctorate-granting institutions. Formal prerequisite for admission to doctoral work is a qualified Master (UAS and U) a Diplom 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 and without completion 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): "Gut (G)" (1) = Very Good; "Gut (G)" (2) = Good; "Vielbefriedigung (V)" = Satisfactory; "Ausreichend (A)" = Sufficient; "Nicht ausreichend (N)" = Not Sufficient/Tail. The minimum passing grade is "Ausreichend (A)". 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 requirements or may 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]
- Landesstrasse 6, D-63113 Bonn; Fax: +49(0)228501-220; Phone: +49(0)228501-0
- Central Office for Foreign Education (ZAB) as German NAIC
- 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/suissesmenarbeis-eurydice-informationsnetz.html; E-Mail: eurydice@kmk.org)
- Hochschulreifeprüfung [Higher Education Entrance Qualification] (KMK/Geheime Räte-Prüfung), Ahnatalstrasse 39, D-63175 Bonn; Fax: +49(0)2286887-110; Phone: +49(0)2286887-0; www.kmk.de; E-Mail: post@zab.de
- "Higher Education Compass" of the German Rectors' Conference features comprehensive information on institutions, programmes of study, etc. (www.higher-education-compass.de)

1 The information covers only aspects directly relevant to purposes of the Diploma Supplement. All information as of 1 July 2010.
2 Berufskollegs are not considered as Higher Education Institutions, they only exist in some 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 Berufskollegs offer Bachelor courses which are recognized as an academic degree if they are accredited by a German accreditation agency.
6 See note No. 5.
7 See note No. 5.