The officially published GERMAN text alone has binding force

Regulations Governing the Aptitude Assessment for the Bachelor's Degree Program Aerospace at the Technical University of Munich

Dated 27 May 2024

In accordance with Art. 9 Sentence 2 in conjunction with Art. 89(6)1 of the Bavarian Higher Education Innovation Act [Hochschulinnovationsgesetzes (BayHIG)] and § 34 of the Regulations on the Qualification for Study at Universities [Qualifikationsverordnung (QualV)] (BayRS 2210-1-1-3-K/WK), the Technical University of Munich issues the following regulations:

§ 1
Purpose of the Assessment

(1) [1]Admission to the Bachelor's Degree Program Aerospace at the Technical University of Munich in the first semester or a higher semester requires a special qualification. [2]The Bachelor's Degree Program Aerospace has a special degree program profile that is described in Appendix 1. [3]Therefore, beyond the requirements listed in the Academic and Examination Regulations (FPSO) as amended, proof of aptitude is required in accordance with the following provisions.

(2) [1]The purpose of the process is to establish whether, alongside the qualification obtained with the higher education entrance qualification, aptitude for the special qualitative requirements of the Bachelor's Degree Program Aerospace is present. [2]The following degree-program competencies (aptitude requirements) are required in addition to the higher education entrance qualification for this degree program:

1. Above-average competencies in MINT subjects (mathematics, physics, chemistry, biology, informatics, technology, and engineering), in particular the ability to think abstractly, logically, and in a system-oriented manner.
2. Particular understanding of technically complex questions as well as the ability to work on solutions effectively by linking methodically different disciplinary cultures, like engineering and natural sciences.
3. Creativity and resourcefulness to work on technical/scientific questions independently and effectively, and to develop them further.
4. Since the course is held in English, good understanding and clear and precise reasoning ability in English, in particular when presenting engineering and technical content.

§ 2
Procedure

(1) The aptitude assessment is held once every six months in the summer semester for the following winter semester and in the winter semester for the following summer semester, but only for applications for the subsequent semester.

(2) The applications for admission to the aptitude assessment for the subsequent winter semester are to be submitted to the Technical University of Munich by 15 July as part of the online application process, or by 15 January for the summer semester (absolute deadlines).

(3) The applications and the aptitude assessment are in English.

(4) The following should be submitted with the application:

1. Curriculum vitae formatted as a table;
2. Documents that are required in accordance with § 6(3) of the TUM Enrollment, Student Fees Payment, Leave of Absence and Disenrollment Regulations (ImmatS) as amended;
3. Details on higher education entrance qualification;
4. Written statement (maximum two pages) giving the reason for choosing the Aerospace degree program at the Technical University of Munich (TUM), in which the applicant describes which skills, talents, and interests make them particularly suited for the intended degree program; their general personal development can also contribute to this, e.g. extracurricular activities;
5. If available, proof of special extracurricular qualifications or additional qualifications relevant to the degree program (e.g. participation in a research competition, vocational training related to the degree program or other degree program-related practical activities in the field, voluntary degree program-related practical courses that go beyond the practical course required in § 36(3) of the FPSO, thematically related practical seminars);
6. a declaration that the written statement giving the reasons for choosing the degree program is the applicant's own work, that the applicant has clearly identified any ideas taken from outside sources, and that it complies with the Code of Conduct for Safeguarding Good Academic Practice and Procedures in Cases of Academic Misconduct of the Technical University of Munich.

§ 3
Aptitude Assessment Commission, Selection Committees

(1) [1]The aptitude assessment is performed by the Aptitude Assessment Commission and the Selection Committee or the Selection Committees, unless specified otherwise in these regulations. [2]The Commission is responsible for preparing the procedure, its organization and for ensuring that the aptitude assessment procedure is structured and standardized in line with these regulations. [3]The Selection Committee is responsible for carrying out the second stage of the procedure in accordance with § 6. [4]The formal admission exam in accordance with § 4 as well as the assignment of points in the first stage in accordance with § 5(1) Nos. 1 and 2 and § 5(2) is carried out by the TUM Center for Study and Teaching – Admissions and Enrollment.

(2) [1]The Aptitude Assessment Commission consists of five members. [2]Members of the Commission are appointed by the Dean, in consultation with the Vice Dean of Academic and Student Affairs, from among the authorized examiners of the TUM School of Engineering and Design, who are members of the degree program faculty. [3]At least three Commission members must be university educators within the meaning of the Bavarian Higher Education Innovation Act [Hochschulinnovationsgesetzes (BayHIG)]. [4]The departmental student council has the right to name a student representative to serve on the Commission in an advisory capacity. [5]A deputy is to be appointed for each member of the Commission. [6]The Commission elects a chairperson and a deputy chairperson from among its members. [7]Procedures are governed by the paragraph on the procedural provisions of the TUM Charter as amended. [8]The term in office of Commission members is 2 years. [9]Extensions of the term of office and reappointments are possible. [10]Urgent decisions that cannot be postponed can be made by the chairperson on behalf of the Commission; He/She must inform the Commission of such decisions without delay. [11]The School Office and the TUM Center for Study and Teaching – Admissions and Enrollment support the Commission in particular with awarding points in accordance with § 5(1)3.

(3) [1]A Selection Committee consists of two members of the TUM School of Engineering and Design, who are authorized to conduct examinations in the degree program according to Art. 85(1) Sentence 1 of the Bavarian Higher Education Innovation Act [Hochschulinnovationsgesetzes (BayHIG)] in conjunction with the act governing examiners at institutions of higher education [Hochschulprüferverordnung]. [2]The members are appointed by the Commission. [3]At least one member must be a university educator within the meaning of the Bavarian Higher Education Innovation Act [Hochschulinnovationsgesetzes (BayHIG)]. [4]The term in office for members is one year. § 3(2) Sentence 9 applies accordingly. [5]It is permissible to serve concurrently on both the Commission and the Selection Committee. [6]For the performance of the second stage in accordance with § 6, a Selection Committee or several Selection Committees can be used. [7]In particular, the Commission may delegate to the School Office the composition of the Selection Committees from the members appointed by the Commission and the assignment of applicants. [8]The School Office can support the Selection Committee or Selection Committees in the performance of the second stage.

§ 4
Admission requirements

[1]Admission to the aptitude assessment process requires that all documentation specified in § 2(4) has been submitted to the Technical University of Munich in a timely and complete fashion. [2]Applicants who have fulfilled the requirements according to Sentence 1 will be admitted to the aptitude assessment. [3]Applicants not suited for the program will receive a letter of rejection stating the grounds for rejection and informing them of legal remedies.

§ 5
Procedure: First Stage

(1) [1]In the first stage of the aptitude assessment procedure, applicants are assessed on the basis of the documents as listed under § 2(4) to determine whether they have the aptitude to study in accordance with § 1.

[2]The following criteria will be applied to the evaluation:

1. Average grade of higher education entrance qualification and

2. subject-specific individual grades
[1]The grades listed in the higher education entrance qualification in the subjects mathematics (triple), English (single), and at least one natural science or informatics (double) continued until the higher education entrance qualification is obtained are used as subject-specific individual grades. [2]If several natural science subjects were continued, their grades can also be specified and taken into consideration with double weighting. [3]The average grade obtained from the last four scholastic terms before obtaining the higher education entrance qualification is used – if available, including the final grades in these subjects listed in the higher education entrance qualification. [4]If no half-term grades are shown, the average grades shown in the higher education entrance qualification are used accordingly. [5]The grades for the term paper or a comparable achievement are not taken into consideration. [6]The subject-specific individual grades are added up and divided by the weighted number of individual grades. [7]If no grade is indicated in the higher education entrance qualification for a subject named in Sentence 2, the factor should be reduced by the corresponding number. [8]If no grades are available for the last four terms in the subjects mathematics, English or at least one natural science or computer science continued up to the attainment of the higher education entrance qualification, the basic understanding in these areas must, in this case, be proven by participation in the second stage in accordance with § 5(3)1 Sentence 2 and Sentence 3. [9]Provided that all individual grades required in accordance with Sentence 8 except the English grade are available, a recognized English certificate (level at least B2) can be submitted instead of participation in the second stage. [10]This proof counts as provided where applicants' language of instruction for the higher education entrance qualification was English.

3. Extracurricular qualifications or additional qualifications relevant to the degree program
[1]As extracurricular qualifications or additional qualifications relevant to the degree program, a maximum of one relevant vocational training course or apprenticeship, an internship of at least four weeks in a relevant field, successful participation in MINT studies (orientation semester at TUM) and successful participation in the “Jugend forscht” or “Mathematik-Olympiade” competitions (at least distinction at state level) will be taken into account for each applicant. [2]The applicants need to be able to prove the qualifications and corresponding documents need to be enclosed with the application in accordance with § 2(4). [3]The Commission will decide on the recognition of the specified extracurricular qualifications or additional qualifications.

(2) The following applies for the calculation:

1. [1]The average grade of the higher education entrance qualification will be converted into points on a scale of 0 to 100, 0 being the worst and 100 the best possible result. [2]The scale should be selected so that a higher education entrance qualification that has just been passed is assessed with 40 points (see Appendix 2 for the conversion formula). [3]Students who claim that they were prevented from achieving a better average grade in the higher education entrance qualification for personal reasons beyond their control will, upon request, be entered into the assessment with the average grade as documented by school reports.

2. [1]The result from the evaluation of the subject-specific individual grades in accordance with § 5(1)2 is converted into points on a scale from 0 to 100 in accordance with § 5(2)1 (see Appendix 2 for conversion formula). [2]If this value is not a whole number, it will be rounded up to the next highest whole number.

3. [1]Each relevant extracurricular qualification or additional qualification in accordance with (1)3 is evaluated in accordance with Appendix 2 No. 4. [2]The applicant can score a maximum of 4 points from the area of extracurricular qualification or additional qualifications.

4. [1]The total from the first stage is calculated from the sum of the higher education entrance qualification points multiplied by 0.5 (No. 1) and the points from No. 2 multiplied by 0.5 as well as the total number of additional points from No. 3. [2]If this value is not a whole number, it will be rounded up to the next highest whole number. [3]The maximum number of points that can be scored for the Bachelor's Degree Program Aerospace in the first stage is 100 points. [4]Evaluations above 100 points are theoretically possible on the basis of § 5(2)3, but are limited to 100 points for the result calculation in accordance with Paragraph 3 – and are therefore already the best possible aptitude.

5. [1]As an exception to No. 1 and No. 2, in the case of candidates who have passed the master's examination or the advanced vocational training examinations recognized by the State Ministry of Education and Cultural Affairs as equivalent to the master's examination, the criterion according to No. 1 is replaced by the criterion of the arithmetic mean of the individual grades of the respective parts of the examination and the criterion according to No. 2 by the criterion of the listed subject-specific individual grades in the subjects of mathematics (triple), English (single), and at least one natural science that was continued until the higher education entrance qualification was obtained or informatics (double) replaces this examination. [2]As an exception to No. 1 and No. 2, in the case of graduates of technical schools and professional academies, the criterion according to No. 1 is replaced by the criterion of the overall examination grade or, if no overall examination grade is shown, by the criterion of the arithmetic mean of the individual grades of the subjects (excluding elective subjects) of the final certificate and the criterion according to No. 2 by the criterion of the subject-specific individual grades in the subjects Mathematics (triple), English (single) and at least one natural science or computer science (double) in the final certificate. [3]If a grade is not indicated for a specified subject, the factor should be reduced by the corresponding number, basic understanding of the areas named in § 1 should be proven in this case in accordance with § 5(3)1 Sentence 2 and Sentence 3 by participating in the second stage. [4]Provided that all individual grades required in accordance with Sentence 3 except the English grade are available, a recognized English certificate (level at least B2) can be submitted instead of participation in the second stage. [5]This proof counts as provided where applicants' language of instruction for the higher education entrance qualification was English.

(3) Result of the first stage of the aptitude assessment:

1. [1]Students who reach 80 points or more in the first stage have passed the aptitude assessment. [2]This does not apply if the subject-specific individual grades in the subjects of mathematics, English, and a natural science continued until the end of the higher education entrance qualification or informatics have not been indicated. [3]In this case, even if the number of points has been reached, the subject-specific aptitude should be proven by completing the second stage of the aptitude assessment.

2. [1]If the score calculated in accordance with Section 2 is 70 points or less, applicants are considered not to be suitable. [2]This also applies when subject-subject-specific individual grades are missing for applicants.

(4) [1]The other applicants are accepted for the second stage of the aptitude assessment. [2]During the second stage of the aptitude assessment, applicants are invited to an aptitude assessment interview. [3]The date of the aptitude assessment interview will be announced by the Commission at least one week in advance.

(5) As an exception to Section 1 to 3, applicants who should be rejected in accordance with paragraph 3 number 2, but still take part in the second stage of the aptitude assessment if they can prove they have completed three-year vocational training that is relevant to the degree program.

(6) As an exception to Section 1 to 3, applicants who were enrolled on the same or a related degree program and are not directly admitted in accordance with the criteria for the first stage, shall take part in the second stage of the aptitude assessment, if they can prove at least 20 credits per semester already completed.

(7) [1]As an exception to Section 1 to 3, applicants who submitted a hardship case application participate in the second stage. [2]All documents must be enclosed with the application. [3]The applicant must prove that he or she has such serious health, social, or family reasons that it would not be proportionate to reject the applicant in the first stage if particularly strict standards were applied.

§ 6
Procedure: Second Stage

(1) In the second stage of the aptitude assessment, the average grade of the higher education entrance qualification and the result of the assessment interview are evaluated, whereby the average grade of the higher education entrance qualification is to be weighted equally.

(2) [1]The aptitude assessment interview is not public and is conducted in English. [2]It is staged as an individual interview by a Selection Committee. [3]With the applicant's approval, a representative of the student body may sit in on the interview. [4]The interview lasts at least 15 minutes and should not be longer than 25 minutes. [5]It should be established whether the applicant expects to reach the goal of the degree program independently and responsibly on an academic basis. [6]No specific previous knowledge beyond the level of general academic high school education unless an application has been submitted in accordance with § 5(6). [7]The above topics may cover the documentation submitted according to § 2(4). [8]The fixed date for the interview should be observed; any applicant who fails to appear at the appointment is considered not to be suitable. [9]Reasons that justify absence for which the applicant is not responsible must be reported in writing to the Chairperson of the Commission by the beginning of the scheduled date and must be substantiated. [10]If the reason is recognized, the applicant will be invited to an interview on an alternative date. [11]Conducting the aptitude assessment interview via video conference is possible upon a student's well-founded request. [12]The applicant bears the risk in the event of any technical problems, unless these are attributable to the Technical University of Munich. [13]The interview will focus on the following topics:

1. Mathematical knowledge that is not based merely on pure numeracy skills, but instead also on mathematical-logical skills that can be used to solve the engineering problems that arise in the Bachelor's Degree Program Aerospace.
2. Knowledge from the fields of technology and natural sciences including informatics that goes beyond basic understanding, in particular the ability to apply common concepts and terms to engineering issues.
3. The ability to combine previous knowledge from methodologically different disciplinary cultures and thus demonstrate the skills of an interdisciplinary problem-solving strategy necessary for successful work in the engineering sciences.
4. Extracurricular qualifications and commitments in the natural sciences and engineering as well as at their interfaces that support the degree program.
5. Language skills combined with clear and precise reasoning ability in English.

[14]The individual topics are weighted as followed in the calculation of the aptitude assessment interview evaluation:

1. Mathematical skills (25 points):
   The applicant is able to quantitatively describe practical applications of mathematics using available mathematical tools; the applicant can analyze problems presented and apply

calculation laws and methods in such a way that usable results are produced within a reasonable time, e.g. the application of school material in certain geometric questions or the ability to derive equations to describe velocities in ordinary physical motions;

2. Knowledge from the areas of technology and natural sciences, including informatics (20 points):
   Candidates are familiar with basic concepts and principles at the secondary school level in the above-mentioned areas; they are therefore able to explain the most important concepts and current developments in the natural sciences as well as in technology and informatics;

3. Ability to solve qualified interdisciplinary problems from the fields of mathematics, technology, and natural sciences, and the ability to combine existing knowledge from methodically fundamentally different disciplinary cultures (35 points):
   Candidates are able to classify scientific, mathematical, and technical issues in everyday life processes in terms of their applicability to engineering problems; connections between the disciplines involved are recognized, and proposed solutions can be developed by comparing possible alternatives;

4. Degree program-specific extracurricular qualifications (10 points):
   Beyond everyday school life, the applicant is involved, for example, through active participation in research competitions or work/project groups with a scientific or technical focus;

5. The candidate is able to answer questions related to subject content and explain concepts and solution steps (10 points):
   They clearly and precisely put forward arguments in English using examples, relevant terminology, and argumentation structures.

[15]On the basis of the weighting regulated in sentence 14, each participating selection committee member evaluates the aptitude interview according to the following scale, subject to the higher education entrance qualification points to be taken into account in accordance with Section 3:

Designation	Points
Excellent	91-100
Good	75-90
Satisfactory	60-74
Sufficient	40-59
Fail	20-39
Inadequate	0-19

[16]The overall assessment of the aptitude interview results from the arithmetic mean of the individual evaluations by the Selection Committee members, if necessary, rounded up to the next highest whole number.

(3) [1]The overall calculation of the second stage results as the sum of the higher education entrance qualification points multiplied by 0.5 (§ 5(2) No. 1) and the points from the aptitude assessment interview multiplied by 0.5 (§ 6(2)). [2]If this value is not a whole number, it will be rounded up to the next highest number in the applicant's favor.

(4) If the overall result calculated in accordance with Section 3 is 75 or higher, aptitude is determined on the basis of the result of the second stage of the aptitude assessment.

(5) Applicants with an overall score of 74 or less are unsuitable for the degree program.

Notifications

[1]Applicants will be informed of the results of the aptitude assessment through official notification. [2]If there is no assessment margin in the evaluation of the individual criteria and in the determination of the overall scores of the First and Second Stage, a resolution by the Commission is not required. [3]Applicants not suited for the program will receive a letter of rejection stating the grounds for rejection and informing them of legal remedies.

§ 8
Documentation

[1]The aptitude assessment process must be documented indicating in particular the evaluation of the aptitude assessment interview by the Selection Committee members, and the overall results. [2]The aptitude assessment interview must be documented, including the date, duration, and location of the assessment, the names of the participating Selection Committee members, the applicant's name, and a list of main topics of discussion in bullet points.

§ 9
Repeat Aptitude Assessments

[1]If candidates fail to receive the proof of suitability for the planned degree program, they can register for the aptitude assessment process one more time. [2]It is not possible to repeat it one more time after that. [3]In justified exceptional cases (written proof of e.g. illness), it is possible to register for a further assessment date.

§ 10
Entry into force

[1]These regulations will enter into force on 1 June 2024. [2]They shall apply for the first time to the aptitude assessment for winter semester 2024/2025. [3]At the same time, the regulations for the aptitude assessment for the Bachelor's Degree Program Aerospace at the Technical University of Munich dated 26 April 2021, most recently amended by the regulations from 26 July 2021, cease to be effective.

Appendix 1

The Bachelor’s Degree Program Aerospace gives enthusiastic, committed young adults the opportunity to complete a high-level, scientifically founded, thematically focused engineering degree program. The thematic focus of the basic studies on the relevant engineering, mathematical, and scientific knowledge in the field of aerospace enables early and targeted specialization. The analytical, creative, and constructive skills for research and development in the fields of aerospace are taught and fostered on the basis of broad and in-depth specialist knowledge in selected areas.

The extremely high safety requirements for aerospace engineering, along with constant testing and questions about existing boundaries and prevailing solutions and systems, place high pressure on aerospace engineers in the field of tension “innovation” vs. “absolute reliability.” They work at the interface between different areas of knowledge and require fundamental, subject-specific, and also highly qualified interdisciplinary knowledge as well as an understanding of the different approaches of the disciplines involved. The Bachelor’s Degree Program Aerospace prepares students for the variety and heterogeneity of these challenges, allowing them to shape them. For this reason, the Aerospace degree program places high demands in terms of the existing special skills required by future students. A high level of technical and constructive understanding paired with strong analytical skills and a systematic, methodical approach is required; other important skills include the ability to make assessments and decisions, as well as conceptual strength. In addition, students need to be able to think holistically so they can understand, design, and construct large and complex systems made up of many complex individual parts and processes in their entirety. Without these prerequisites, a Bachelor’s Degree Program Aerospace cannot be completed successfully.

Aerospace engineers work in an extremely inter- and transdisciplinary and international environment, which is also reflected in their very diverse range of activities. They must be able to network knowledge and skills from a wide range of disciplines and make them usable for specific technical applications. This is why the training program focuses on interdisciplinarity, sustainability, and the special challenges of technological limits from extreme material stress to maximum energy efficiency right from the start.

The bachelor's degree program is structured in such a way that, in the first semesters, the elementary mathematical, engineering, and scientific basics are taught across a broad basis, and also in depth in relevant areas. On these foundations, the students work on the constructive modules that address topics such as fluid mechanics, thermodynamics, and heat transfer using their ability to think in a networked and interdisciplinary way. The various areas of specialization available on the course (System, Propulsion, Fluid Dynamics, Structure, and Dynamics) are each characterized by their own very high degree of specialization. In order to specialize in the individual areas, you need a broad technical and scientific foundation as well as comprehensive basic knowledge in all five areas of specialization. Students need to be able to understand the various disciplines and subject areas so that they can link them together and develop solutions. For this reason, it is highly important that applicants are able to independently learn content that has not been taught in school, but is an essential fundamental for studying engineering at university level. Furthermore, they need to be able to also link this newly learned content also to each other directly across disciplines and thus gain access to completely new subjects like Control Technology, Fluid Mechanics, computer-aided modeling and simulation, or material sciences.

The applicants need to demonstrate this ability using their qualification for study, whereby this depends on both the overall evaluation, and also the grades in the scientific/technical subjects. A solid basic education in these subjects is essential for commencement of the university studies. To take into account the close international networking in the aerospace sector, the degree program is offered in English already at bachelor’s level. This means that adequate English knowledge is required.

Appendix 2

Conversion Formulae

The conversion of various grading scales into points on a scale from 0 to 100 is carried out in accordance with regulations no. 1 to 3. 100 points correspond to the best possible grade and 40 points correspond to a performance that has just passed in the respective initial grading system.

1. German Grade System
With 1 being the best grade and 6 the worst

Points = 120 – 20 * grade

The grades 1, 2, 3, 4, 5, and 6 therefore correspond with 100, 80, 60, 40, 20, and 0 points. Since HIGHER EDUCATION ENTRANCE QUALIFICATION grades are only given up to one decimal place on German certificates, it is not necessary to round up to whole numbers when using formula no. 1.

2. German Scoring System (e.g. college level)
With 15 being the best grade and 0 the worst

Points = 10 + 6 * point value

3. Any numerical grading system
With grade N, whereby N_{opt} is the best evaluation and N_{pass} is just enough to pass.

$$\textbf{Points} = 100 - 60 * (N_{opt} - N) / (N_{opt} - N_{pass})$$

If the number of points calculated according to the formula given is not a whole number, it will be rounded up to the next highest whole number in the applicant's favor.
Example: The following applies in the Bulgarian grade system: $N_{opt} = 6$, $N_{pass} = 3$ and 1 is the worst possible grade. The specified formula is simplified as: Points = 100 – 20 * (6-N).

4. Additional Points for Relevant Extracurricular Qualifications or Additional Qualifications

Points are awarded for the extracurricular qualifications and additional qualifications shown in the overview, which can be added together. A maximum of 4 points can be included in the calculation. The Commission will decide on the recognition of the specified qualifications.

Type of supplementary training and education	Duration				
	Full time (≥ 35 hrs/week)			Part time	
	1-5 months	6-12 months	> 1 year	> 1 year	> 3 years
Training	0	2	4	2	4
Internship	1	2	3	2	3
MINT studies (TUM)	1				
Competition in accordance with § 5(1)3 page 1	1				

Executed following a resolution of the Senate of the Technical University of Munich dated 15 May 2024 and approval of the President of the Technical University of Munich on 27 May 2024.

Munich, 27 May 2024
Technical University of Munich

signed by
Thomas F. Hofmann, President

These regulations were officially published online on the website https://www.tum.de/satzungen on 27 May 2024. In addition, access is available during office hours on the premises of the TUM Center for Study and Teaching - Legal Affairs, Arcisstraße 21, 80333 Munich, Room 0561. Day of proclamation is therefore 27 May 2024.