

## **Appendix 2: Aptitude Assessment**

### **Aptitude Assessment for the Master's Degree Program Matter of Life at the Technical University of Munich**

#### **1. Purpose of the Process**

<sup>1</sup>Eligibility for the Master's Degree Program Matter to Life, in addition to the requirements pursuant to § 36(1) 1 to 3, requires proof of aptitude pursuant to § 36(1) 4 in accordance with the following provisions. <sup>2</sup>The special qualifications and skills of the candidates should correspond to the professional field Basic Research in Matter to Life. <sup>3</sup>Individual aptitude parameters are:

- 1.1 Ability to do scholarly work and basic, methodologically sound research,
- 1.2 specialist knowledge gained in undergraduate degrees in Physics, Computer Science, Chemistry, Biochemistry, Bioengineering or comparable disciplines,
- 1.3 aptitude and interest for the pursued degree program and a scientific career in Basic Research, with a particular affinity for biophysical, biochemical, and biomathematical questions in the area of Matter to Life, as well as a general understanding of the Natural Sciences.

#### **2. Aptitude Assessment Process**

2.1 Aptitude assessment is conducted twice annually by the Department of Physics.

2.2 <sup>1</sup>Applications for admission to the aptitude assessment process for the winter semester must be submitted to the Technical University of Munich together with the documents listed in 2.3.1. through 2.3.5. and in § 36(1) 2 no later than 1 December of the year prior to commencement of the program (absolute deadline) using the online application process. <sup>2</sup>The diploma and the graduation certificate must be presented as proof of passing the Bachelor's degree program to the Application and Enrollment Office of the Technical University of Munich five weeks after the first day of classes, at the latest. <sup>3</sup>Otherwise, it will not yet be possible to commence the Masters degree program in accordance with § 36 of these regulations.

2.3 The application must include:

- 2.3.1 a transcript of records containing modules amounting to at least 120 credits; the transcript of records must be issued by the relevant examination authority or academic programs office,
- 2.3.2 the curriculum on which the first degree program was based, indicating the respective contents of the module and the competences acquired (e.g. module handbook, module descriptions),
- 2.3.3 curriculum vitae in English (formatted as a table),
- 2.3.4 a written statement in English of a maximum of 6,000 characters (approx. three DIN A4 or US Letter pages, Helvetica or Arial font, font size 12, line spacing 1.5), in which the applicant explains those specific talents and interests that make them particularly qualified for the Master's degree program at the Technical University of Munich and indicates which research goals they would like to pursue in the area of Matter to Life; further reference points for the written statement are the aptitude parameters listed in 5.1.1 c); the applicant's suitability and willingness to perform is to be demonstrated by providing details on program-related vocational training, internships, stays abroad, or program-related further education beyond the attendance and course requirements of the Bachelor's program, or similar; if necessary supported by appropriate documentation,
- 2.3.5 a declaration that the essay is the applicant's own work, and that the applicant has clearly identified any ideas taken from outside sources.

#### **3. Aptitude Assessment Commission**

3.1 <sup>1</sup>The aptitude assessment is administered by a Commission that, as a rule, consists of the Dean of Studies in charge of the Master's Degree Program Matter to Life, at least two members of the professorial faculty and at least one research associate (wissenschaftlicher Mitarbeiter,

wissenschaftliche Mitarbeiterin). <sup>2</sup>At least half of the Commission members must be members of the professorial faculty, as well as fellows of the Max Planck School Matter to Life.

- 3.2 <sup>1</sup>The members of the Commission are appointed by the Department Council in consultation with the Dean of Studies. <sup>2</sup>At least one member of the professorial faculty is appointed as deputy member of the Commission. <sup>3</sup>As a rule, the Commission is chaired by the Dean of Studies. <sup>4</sup>Procedural regulations will be in accordance with Art. 41 of the BayHSchG as last amended.
- 3.3 <sup>1</sup>Once the Commission acts in accordance with these regulations, it is permissible to delegate certain duties to individual members of the Commission on a revocable basis. <sup>2</sup>If, pursuant to Sentence 1, only one member of the Commission acts in the performance of certain duties, they must be a member of the professorial faculty. <sup>3</sup>If, pursuant to Sentence 1, two or more members of the Commission act in the performance of certain duties, at least half of them must be members of the professorial faculty. <sup>4</sup>The Commission is to ensure the proper allocation of duties. <sup>5</sup>If there is a scoring margin for one of the evaluation criteria of the aptitude assessment and if at least two members of the Commission are involved in the evaluation of that criterion, the members of the Commission shall make their evaluations independently according to the indicated weighting, unless otherwise specified; The points total will be calculated as the arithmetic mean of the individual assessments, rounded up to the nearest full point.

#### **4. Admission to the Aptitude Assessment Process**

- 4.1 Admission to the aptitude assessment process requires that all documentation specified in No. 2.3 has been submitted in a timely and complete fashion.
- 4.2 Applicants who have fulfilled the requirements will be assessed according to No. 5.
- 4.3 Applicants who are not accepted will receive a letter of rejection stating the grounds for rejection and informing them of legal remedies.

#### **5. The Aptitude Assessment Process**

##### **5.1 First Stage:**

- 5.1.1 <sup>1</sup>The commission will assess, on the basis of the written application documents required under No. 2.3, whether or not an applicant is suitable for a program pursuant to No. 1 (First stage of the aptitude assessment process). <sup>2</sup>For this purpose, the commission evaluates and scores the candidate's application documents on a scale ranging from 0 to 100 points, 0 being the worst and 100 the best possible result.

The following criteria will be applied to the evaluation:

##### **a) Discipline-Specific Skills and Qualifications**

<sup>1</sup>In accordance with 2.3.1, the Commission assesses the existing expertise gained in a Bachelor's degree as defined in No. 1.2 on the basis of the documentation submitted. <sup>2</sup>The curricular analysis is conducted on the basis of competences, rather than a schematic comparison of modules. <sup>3</sup>The analysis is based on the fundamental subject groups listed in the following table. <sup>4</sup>The benchmark for the competences to be demonstrated in each subject group are the modules from one of the Bachelor's degree programs in Engineering or the Natural Sciences at the Technical University of Munich listed in the table.

Subject Group	Points
<p><b>1 Introduction to Physics</b> (Mechanics, Electrodynamics, Thermodynamics, Oscillations, Waves and Optics, Quantum Mechanics) Benchmark: The following required modules of the TUM Bachelor's Degree Program Chemistry</p> <ul style="list-style-type: none"> <li>• PH9002 Experimental Physics 1 for Chemistry and</li> <li>• PH9003 Experimental Physics 2 for Chemistry or PH9018 Experimental Physics 2 for Biochemistry</li> </ul>	10
<p><b>2 Introduction to Mathematics</b> (Fundamentals of Linear Algebra, Introduction to Analysis) Benchmark:</p> <ul style="list-style-type: none"> <li>• CH0105 Mathematical Methods in Chemistry 1</li> <li>• CH0112 Mathematical Methods in Chemistry 2</li> </ul>	10
<p><b>3 Introduction to Chemistry</b> (Fundamentals of General, Inorganic, and Organic Chemistry, Core Concepts of Biochemistry) Benchmark: The following required modules of the TUM Bachelor's Degree Program Physics</p> <ul style="list-style-type: none"> <li>• CH1104 Chemistry for Physicists</li> </ul>	10
<p><b>4 Introduction to Biology</b> (Biochemistry, Molecular Biology, Cell Biology) Benchmark: The following required modules of the TUM Bachelor's Degree Program Bioinformatics</p> <ul style="list-style-type: none"> <li>• IN5113 Biology</li> <li>• IN5167 Fundamentals of Biochemistry</li> </ul>	10

<sup>5</sup>If it is established that there are no significant differences in the competences acquired (learning outcomes), a maximum of 40 points will be awarded (10 points max. in each subject group). <sup>6</sup>If some of the equivalent competences are missing, points are deducted according to the percentage that the missing competences contribute to the overall content of the respective subject group, as measured by the indicated benchmark modules. <sup>7</sup>Only whole points are awarded. <sup>8</sup>The resulting points are used as the base score in the subsequent aptitude assessment.

#### b) Final Grade

<sup>1</sup>The applicant will be awarded 1.5 points for each tenth that the average calculated from examinations in the amount of 120 credits is better than 3.0. <sup>2</sup>The maximum number of points is 30. <sup>3</sup>Negative points will not be awarded. <sup>4</sup>Grades of international degrees will be converted by applying the Bavarian formula. <sup>5</sup>If the candidate has submitted a degree certificate containing more than 120 credits with the application, the assessment will be made on the basis of the best graded modules in the amount of 120 credits. <sup>7</sup>The applicant needs to submit a list of the results together with the application and confirm its accuracy in writing. <sup>8</sup>The average is calculated from graded module examinations amounting to 120 credits. <sup>9</sup>The overall grade average is calculated as a weighted grade average. <sup>10</sup>The grade weights of the individual modules correspond to the credits assigned to each module. <sup>11</sup>In the process of determining grades, only the first digit after the decimal point is taken into account. All other digits are dropped without rounding.

c) **Letter of Motivation**

<sup>1</sup>The applicant's written statement will be evaluated by two members of the Commission and graded on a scale of 0 – 30 points. <sup>2</sup>The content of the written statement will be assessed using the following criteria:

1. Discussion of the qualification with respect to the requirements of the degree program and the admission requirements as set out in point 5.1.1 a) ( 15 points max.),
2. discussion of the objectives in the chosen program (Master's Study Phase); Applicants are to demonstrate that they have already familiarized themselves with the chosen degree program and have at least made a rough selection of which areas from the wide range of choices are of particular interest to them (max. 5 points),
3. discussion of possible research goals in the prospective doctoral phase of the Matter to Life program, ideally in the form of a short proposal (maximum 10 points).

<sup>3</sup>Commission members independently assess each of the three criteria, weighting the criteria according to the number of maximum points achievable. <sup>4</sup>The number of points will be calculated as the arithmetic mean of the individual evaluations by the members of the Commission.

- 5.1.2 <sup>1</sup>The points total in the first stage will be calculated as the sum of the individual evaluations. <sup>2</sup>Decimal places must be rounded up.
- 5.1.3 <sup>1</sup>Applicants who have achieved at least 70 points will be invited to an assessment interview via videoconference as specified in 5.2.
- 5.1.4 <sup>1</sup>Unsuitable applicants with a total score less than 70 points in stage one of the assessment process will receive a rejection letter stating the grounds for rejection and informing them of legal remedies. The letter is to be signed by the president. <sup>2</sup>The authority to sign can be delegated.

5.2 Second Stage: Assessment Interview via Videoconference

- 5.2.1 <sup>1</sup>The remaining applicants will be invited to an assessment interview, which will usually involve a videoconferencing tool. <sup>2</sup>During the second stage of the aptitude assessment, both the skills acquired during the applicant's Bachelor's studies, the final grade, the letter of motivation and the result of the videoconference-based assessment interview will be assessed. <sup>3</sup>Interview appointments will be announced at least one week in advance. <sup>4</sup>Time slots for interviews must be scheduled before the application deadline ends, usually they take place in January and February. <sup>5</sup>The interview appointment must be kept by the applicant. <sup>6</sup>If the applicant is unable to attend an aptitude assessment interview due to reasons beyond his/her control, a later appointment may be scheduled upon a student's well-grounded request, but no later than two weeks before the beginning of classes.
- 5.2.2 <sup>1</sup>The aptitude assessment interview is to be held individually for each applicant. <sup>2</sup>The interview lasts at least 15 but not more than 30 minutes for each applicant. <sup>3</sup>The interview will focus on the following topics:
1. exceptional motivation for the Master's Degree Program Matter to Life according to the criteria for assessing the written letter of motivation/statement of purpose mentioned in No. 2.3.3 (5 points max.),
  2. discussion of the qualification with respect to the requirements of the degree program and the admission requirements as set out in point 4.2, in particular, experience with relevant experimental and theoretical methods (maximum 10 points),
  3. general knowledge in the area of Matter to Life and an understanding of the relevant issues and interrelationships to be demonstrated by outlining the solution to an exemplary problem, e.g. using the letter of motivation/statement of purpose submitted by the applicant (10 points max.),
  4. ability to communicate in English (10 points max.).

<sup>4</sup>The above topics may cover the documentation submitted according to 2.3. <sup>5</sup>Any subject-specific academic knowledge that is to be taught in the Master's Degree Program Matter to Life will not affect the decision.

- 5.2.3 <sup>1</sup>The aptitude assessment interview will be conducted by at least two members of the Commission. <sup>2</sup>Commission members independently assess each of the four criteria, weighting the areas according to the number of maximum points achievable. <sup>3</sup>Each member of the Commission will grade the result of the interview on a scale from 0 to 35, 0 being the worst and 35 being the best possible result. <sup>4</sup>The number of points will be calculated as the arithmetic mean of the individual evaluations by the members of the Commission. <sup>5</sup>Non-vanishing decimal places must be rounded up.
- 5.2.4 <sup>1</sup>The total number of points awarded in stage two with a maximum number of points of 135 is the sum of the points from 5.2.3 and 5.1.1 a) - c) (subject-specific qualification, final grade, letter of motivation/statement of purpose). <sup>2</sup>Applicants who have achieved at least 101 points will be invited to an assessment interview as specified in 5.3.
- 5.2.5 <sup>1</sup>Unsuitable applicants with a total score less than 101 points will receive a rejection letter stating the grounds for rejection and informing them of legal remedies. The letter is to be signed by the president. <sup>2</sup>The authority to sign can be delegated.

### 5.3 Third Stage: Personal Aptitude Assessment Interview

- 5.3.1 <sup>1</sup>The remaining applicants will be invited to a personal assessment interview. <sup>2</sup>During the third stage of the aptitude assessment, both the skills acquired during the applicant's Bachelor's studies, the final grade and the result of the assessment interview will be assessed. <sup>3</sup>The exact date for the assessment interview will be scheduled by the Commission in consultation with the applicants. <sup>4</sup>Time slots for interviews must be scheduled before the application deadline ends, usually they take place in January, February and March. <sup>5</sup>The interview appointment must be kept by the applicant. <sup>6</sup>If the applicant is unable to attend an aptitude assessment interview due to reasons beyond his or her control, a later appointment may be scheduled upon a student's well-grounded request, but no later than two weeks before the beginning of classes.
- 5.3.2 <sup>1</sup>The aptitude assessment interview is to be held individually for each applicant. <sup>2</sup>The aptitude assessment interview takes about 30 minutes and will be conducted by at least two members of the Commission. <sup>3</sup>Applicants will be provided with a technical text at least three days before the interview, the contents of which will be discussed during the interviews. <sup>4</sup>The interviews will focus on the following topics:
1. Ability to participate in academic discussions (15 points max.),
  2. ability to reflect on research questions (15 points max.),
  3. aptitude for scientific work (20 points max.),
  4. communication skills/ ability to work in a team (15 points max.).
- 5.3.3 <sup>1</sup>Commission members independently assess each of the topics, weighting the areas according to the number of maximum points achievable. <sup>2</sup>Each member of the Commission will grade the result of the interview on a scale from 0 to 65, 0 being the worst and 65 being the best possible result. <sup>3</sup>The points total will be calculated as the arithmetic mean of the individual evaluations. <sup>4</sup>Non-vanishing decimal places must be rounded up.
- 5.3.4 <sup>1</sup>The total number of points awarded in stage three with a maximum number of points of 135 is the sum of the points from 5.3.3 and the points from 5.1.1.a (subject-specific qualification) and 5.1.1.b (grade). <sup>2</sup>Applicants who score 101 or more points will be deemed suitable.
- 5.3.5 <sup>1</sup>The applicant will receive the Commission's result for the aptitude assessment in writing. <sup>2</sup>The letter is to be signed by the president. <sup>3</sup>The authority to sign can be delegated. <sup>4</sup>Rejection letters shall state the grounds for rejection and inform the applicant of legal remedies.
- 5.3.6 Admissions to the Master's Degree Program Matter to Life apply to all subsequent applications for this program.

## 6. Documentation

<sup>1</sup>The aptitude assessment process must be documented. <sup>2</sup>A record is to be kept about the conduct of the assessment interview (date, place, beginning and end of the interview, the names of the Commission members present, the names of the applicants, as well as any unusual occurrences). <sup>3</sup>The record of the assessment interview must furthermore include the main topics and results of the interview; these can be listed as keywords.

## **7. Repeat Aptitude Assessments**

If candidates fail to receive the proof of suitability for the Master's Degree Program Matter to Life they can register for the aptitude assessment process one more time.

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Executed following a resolution of the Senate of the Technical University of Munich dated 20 March 2019 and approval of the President of the Technical University of Munich on 1 August 2019.

Munich, 1 August 2019

Technical University of Munich

Wolfgang A. Herrmann  
President

These Regulations were made available for inspection at the Technical University of Munich on 1 August 2019, following their announcement on 1 August 2019. Day of proclamation is therefore 1 August 2019.