

# Degree Program Documentation

## Bachelor's Program

### Life Sciences Nutrition

Part A  
TUM School of Life Sciences  
Technische Universität München

## General information:

- Administrative responsibility: TUM School of Life Sciences
- Name of degree program: Life Sciences Nutrition
- Degree: Bachelor of Science (B.Sc.)
- Standard duration of study and credits:  
6 Semesters and 180 credit points (CP)
- Form of study: full time
- Admission: Aptitude assessment procedure (EFV)
- Start: Winter semester (WiSe) 2024/25
- Language: German
- Main location: Weihenstephan (Freising)
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## Table of contents

|          |  |           |
|----------|--|-----------|
| <b>1</b> | <b>Degree Program Objectives</b> .....           | <b>4</b>  |
| 1.1      | Purpose .....                                    | 4         |
| 1.2      | Strategic Significance .....                     | 5         |
| <b>2</b> | <b>Qualification Profile</b> .....               | <b>5</b>  |
| <b>3</b> | <b>Target Groups</b> .....                       | <b>8</b>  |
| 3.1      | Target Audience .....                            | 8         |
| <b>5</b> | <b>Competition Analysis</b> .....                | <b>12</b> |
| 5.1      | External Competition Analysis .....              | 12        |
| 5.2      | Internal Competition Analysis .....              | 13        |
| <b>6</b> | <b>Program Structure</b> .....                   | <b>14</b> |
| 6.1      | Curriculum .....                                 | 14        |
| 6.2      | Modules .....                                    | 16        |
| 6.3      | Stays abroad as part of the Degree Program ..... | 18        |
| <b>7</b> | <b>Organization and Coordination</b> .....       | <b>20</b> |
| <b>8</b> | <b>Enhancement Measures</b> .....                | <b>22</b> |

# 1 Degree Program Objectives

## 1.1 Purpose

Nutrition has a decisive influence on human health and well-being. It is of great importance for normal development and physiology as well as for the prevention of diseases. Nutritional science faces three major challenges in today's world:

- In industrialized countries, the human nutritional environment is undergoing dynamic change due to the development of new foods and production processes, the variety, quality and availability of food. Health problems result from excessive intake, as well as allergies and intolerances.
- In contrast, climate change is jeopardizing food security in large parts of the world. This is leading to a massive increase in health problems, most of which are caused by malnutrition and undernourishment.
- Malnutrition is also increasingly recognized as a problem in industrialized countries, particularly in the clinical care of patients and in the care of the elderly.

Nutritional influences during early development can lead to metabolic imbalances in later life. Long-term malnutrition manifests itself in the development of a positive energy balance and obesity, with an increased risk of complex secondary diseases. Malnutrition and malnutrition are therefore both local and global challenges to preventive healthcare. In addition, food intolerances and allergies are increasingly taking centre stage and require more intensive research into their causes. The rising prevalence of diseases caused or partly caused by diet is placing a considerable burden on public healthcare systems. This represents a challenge for society as a whole that requires nutritional science expertise in teaching and research for the development and application of effective preventive measures and therapies.

The aim of the degree program is to train students to become scientists who work at the interface of biochemistry, (intestinal) microbiology, physiology and medicine in an interdisciplinary manner in order to research the effects of changes in the nutritional environment on the human organism and to identify ways to improve nutrition. The in-depth specialist knowledge of human nutritional requirements, the physiological effects of nutrients and the underlying molecular and biochemical processes in the body required for this is acquired in the degree program. This knowledge is required to test and assess new foods in terms of their nutritional value, needs assessment, physiological effects and safety, also taking into account legal requirements.

The ability to analyze the physiological effects of food, guarantee safety and test/evaluate tolerability and acceptance is a unique feature of nutritional science. This qualifies nutritionists to serve the broad public interest in nutritional issues on the basis of scientific knowledge.

The aim of the degree program is also to motivate as many successful graduates of the Bachelor of Life Sciences in Nutritional Science as possible to continue their scientific studies and take up a scientific career. Practical training in the laboratory, which takes place in smaller groups and thus enables individualized feedback on performance, also serves this purpose.

## 1.2 Strategic Significance

Under its "One Health" mission, the TUM School of Life Sciences combines the key competences required to research the foundations of human life. The program complements the Bachelor's degree courses offered in the following degree program with bioscientific competence profiles:

- B.Sc. Life Sciences Biology
- B.Sc. Molecular Biotechnology
- B.Sc. Agricultural Sciences and Horticultural Sciences
- B.Sc. Forest Science and Resource Management

The degree program is also linked to the Bachelor's degree program in Food Chemistry at the TUM School of Natural Sciences in Garching.

The Bachelor's degree program in Life Sciences Nutrition addresses a central focus in terms of content. In particular, it complements degree programs that deal with agricultural and horticultural production, as well as the degree programs in Food Chemistry, Food Technology, Brewing and Beverage Technology, which focus on food, with aspects of nutrition and maintaining human health. As part of its strategic positioning, the TUM School of Life Sciences follows the guiding principle of "One Health", which requires broad scientific research into the foundations of life and human health with all life science disciplines. The Bachelor's degree programs based on Life Sciences at the School of Life Sciences Campus use the same basic chemistry, mathematics, genetics and biology modules in the first year of study. This follows the guiding principle of scientificity as the basis of teaching and anchors the degree program in the series of exact sciences, which makes quantitative and mathematically precise statements and provides experimentally testable hypotheses. On the other hand, it opens up opportunities for students to switch between degree programs at the School of Life Sciences.

The Life Sciences Nutrition degree program is committed to TUM's vision of sustainability in many respects. People's eating habits characterize agricultural production, which has an immense influence on the release of climate-damaging emissions. We address our students' need for information and make the topic of sustainability a core aspect of teaching, for example in the field of food technology or in nutritional physiology, when assessing the suitability of plant protein sources for human nutrition.

The continuation of the nutritional science program in the English-language Master's degree course "Nutrition and Biomedicine" is also a strategic goal. The focus here is on nutritional prevention and intervention with a research-orientated focus. With their competence profile, graduates can also continue their academic education in other Master's degree programs in the life science disciplines at the TUM School of Life Sciences.

## 2 Qualification Profile

The content of the following qualification profile corresponds to the requirements of the Qualifications Framework for German Higher Education Qualifications (Hochschulqualifikationsrahmen - HQR) and the requirements contained therein (i) knowledge and understanding, (ii) use, application and generation of knowledge, (iii) communication and cooperation and (iv) scientific self-image/professionalism. The formal aspects according to the HQF (admission requirements, duration, degree options)

are detailed in chapters 3 and 6 as well as in the corresponding subject examination and study regulations.

### **Knowledge and Understanding**

Our graduates have orientated knowledge in mathematics and statistics, chemistry and physics, in the context of experimental research in the life sciences, as well as in cell biology and genetics. This knowledge gives them access to an understanding of the methodological and technical procedures in nutritional science and the molecular structures, biochemical substance conversions and physiological processes. They learn the basics of human nutrition and have a broad knowledge of human physiology, specializing in nutritional physiology, endocrinology, metabolism and energy balance. Advanced knowledge is acquired in the related bioscientific disciplines of food chemistry, biochemistry and microbiology. This specialized knowledge can be used in the context of nutritional science questions, for example on the composition and function of the intestinal microbiota. Graduates are familiar with the chemical properties of food and the influence of production, processing and preparation on its physiological and sensory properties. In the field of human nutritional physiology, they have a comprehensive knowledge of the processes involved in the processing and utilization of food components. They know all the essential food components for humans and can describe the respective function in the body at a molecular level. Our graduates also acquire an individual and self-determined competence profile in specialist disciplines of nutritional science (pediatric nutritional medicine, immunology, food technology, food microbiology and law, toxicology and public health). They are able to communicate their individually acquired knowledge or results to a wide audience. In doing so, they observe important rules for the creation of scientific documents, are confident in dealing with databases and know the importance of the correct use of references.

### **Use, Application and Generation of Knowledge**

Graduates of this program are able to analyze the physiological effects of food components and to test and assess their safety for the consumer. Based on their methodological knowledge, they are also able to plan simple experiments, carry them out in practice and document, analyze and interpret the data obtained. In addition, graduates have knowledge of nutritional medicine that enables them to apply for and accompany the implementation of clinical studies. They are able to assess the pathophysiological causes of food intolerances and recognize and investigate the reasons for malnutrition and malnutrition. Graduates develop concepts that correspond to the current state of science in order to solve current problems. They actively contribute their expertise to working groups and thus make valuable contributions to solving complex tasks.

### **Communication and Cooperation**

Graduates of this program have mastered the ability to present the results of their own practical or theoretical work to a specialist audience in a comprehensible manner and to discuss them with colleagues at a scientific level. They are able to research, analyze, summarize, present and evaluate the current state of knowledge of research on a specific nutritional science issue independently or in a team. Furthermore, graduates can develop plans for experimental investigations or clinical studies. Depending on the scope and interdisciplinarity of the research question, they are able to plan and conduct experiments or studies independently or in a team and to analyze and evaluate the results

obtained, including the necessary statistical analysis. Graduates' organizational skills extend to self-organization and team management, whereby they can make use of suitable means of communication and electronic platforms. In doing so, they set milestones for progress, meet deadlines and develop projects in teams, distribute tasks and summarize solutions. They are able to apply theoretical knowledge in a solution-orientated manner to specific technical issues and have acquired profile-building specialist skills and key qualifications in elective subjects. In addition, they are able to conceptualize scientific lectures and present them to specialist audiences. Graduates have a sound knowledge of important rules for creating scientific documents, are confident in working with databases and understand the importance of the correct use of references. In addition, the degree program offers the opportunity for individual commitment, for example in the student council or other committees. This shows the graduates' sense of responsibility towards their fellow students as well as for successful studies and the further development of the degree program in general. The interaction with students and lecturers enables them to acquire additional qualifications in the field of communication and to gain a deeper insight into the organization of the university. By participating in various associations, working groups and the wide range of electives offered by TUM, students broaden their view of fields of interest outside their own area of specialization.

### **Scientific Self-image and Professionalism**

Graduates of the degree program develop confidence in their own abilities and a self-confidence in dealing with scientific issues. Both enable them to assert themselves in academic and non-academic professional fields. Based on a critical assessment of your own abilities, you will be able to recognize and use your individual creative freedom and make fact-based decisions. You will be able to penetrate the complexity of scientific issues and creatively search for possible solutions.

Graduates are familiar with important framework conditions for professional activities, such as legal requirements in the area of food production and labelling, and are able to apply these. They are familiar with the reference values for the intake of nutrients and can critically evaluate them. They are familiar with the public's expectations regarding the development of solutions for nutrition-related diseases and are also aware that nutrition research is the focus of the general population like no other scientific discipline. Our graduates are therefore able to critically assess the consequences and effects of their professional actions in relation to social expectations and consequences.

Throughout the program, graduates are motivated to develop their own understanding of the multi-layered (biochemical/physiological/medical/ecological/socio-political) implications of nutrition as an environmental factor and are enabled to use their knowledge and skills to carry out responsible activities in the professional field of nutritional science.

## 3 Target Groups

### 3.1 Target Audience

The program is aimed at national and international high school graduates who enjoy scientific subjects and have a general interest in and understanding of chemical, biological and medical issues. You should not be aiming to train as a nutritionist, but rather to pursue a career in research. As scientists, they want to contribute to the development of treatment options for nutrition-related diseases as well as malnutrition and malnutrition and at the same time ensure the sustainable nutrition of mankind. The Bachelor's degree program in Life Sciences Nutrition aimed at applicants who appear suitable for an interdisciplinary, research-driven study of human nutrition with many practical elements based on the principles of natural and life sciences and medicine.

### 3.2 Prerequisites

Admission to the Bachelor's degree program in Life Sciences Nutrition subject to the general admission requirements for studying at a university in accordance with the Ordinance on Qualifications for Studies at Universities of the Free State of Bavaria and State-recognized non-state universities (Qualification Ordinance-QualV) (BayRS 2210-1-1-3-UK/WFK) in the currently valid version.

The Life Sciences Nutrition degree program requires the motivation and ability to acquire the necessary general scientific foundations (chemistry, physics, mathematics and biology) as well as the basic disciplines of biochemistry, microbiology, human nutrition and human physiology.

Interested parties should have already acquired basic knowledge of the scientific subjects of biology, chemistry, physics and math as part of their school education (see 3.1). Basic IT skills and the ability to self-organize learning are a prerequisite.

International applicants must also provide proof of sufficient German language skills. The regulations for this are defined at <https://www.tum.de/studium/internationale-studierende/>.

The Life Sciences Nutrition degree program is an admission-restricted degree program with a two-stage aptitude assessment procedure. As part of the aptitude assessment procedure, an online aptitude test is used to determine whether, in addition to the qualifications proven by obtaining the higher education entrance qualification, the applicant is suitable for the special qualitative requirements of the Bachelor's degree program in Life Sciences Nutrition.

Suitable applicants should have a very good grounding in the classical disciplines of natural and life sciences combined with a keen interest in applied research in the context of nutritional medicine.

In order to meet the interdisciplinary requirements profile of this degree program and ensure a sustainably high level of education, applicants must meet the highest standards in the natural sciences and mathematics. The best continued science up to the Abitur is included in the calculation of the first stage of the aptitude assessment procedure with a multiplier of 0.5, as is the subject of mathematics.

Due to its interdisciplinary nature, applicants should have a basic knowledge of **biology**. Human genetics, cytology / histology, anatomy and physiology as well as the basics of biochemical processes of food processing serve to understand the contents of the nutritional science program.



A good knowledge of **chemistry** is crucial for a successful degree program in Life Sciences Nutrition. Together with knowledge of inorganics and organics, this subject forms the basis for understanding biochemistry and nutritional physiology as well as pharmacology and toxicology and therefore for all metabolic processes relevant to the degree program. Without a sound knowledge of this subject, structural interactions within or between metabolic metabolites are inconceivable.

A basic knowledge of **physics** is the basis for understanding biophysical, biochemical and physiological relationships in the basic subjects of the Life Sciences Nutrition degree program. In the context of the degree program, this concerns, for example, the concept of energy and the unlimited convertibility between various forms of energy. **Mathematics** is also an important factor in the success of the degree program. Differential and integral calculus as well as linear algebra are required as an important foundation for the Life Sciences Nutrition degree program. In addition, good and very good grades in this subject also play an important role in biostatistics as an essential prerequisite for understanding and evaluating epidemiological studies and clinical intervention studies.

### 3.3 Target Numbers

The admission-restricted Bachelor's degree program in Nutritional Science was established in 2001. From 2001 until the winter semester 2010/11, admission was restricted in the form of an aptitude assessment procedure. Later, in the winter semester 2010/11, a numerus clausus (NC) was introduced for this degree program due to the increasing number of applications.

In winter semester 2019/20, the Bachelor's degree program in Nutritional Science was replaced by the new Bachelor's degree program in Life Sciences Nutrition. And in winter semester 2021/22, the NC for the Bachelor's degree program in Life Sciences Nutrition was abolished and an aptitude assessment procedure was reintroduced. The aim of the introduction of the aptitude assessment procedure (two-stage) is to reduce the drop-out rate in the Bachelor's degree program after the foundation course by selecting suitable applicants.

The following figure shows the development of the number of applicants and first-year students in the Life Sciences Nutrition degree program between 2019 and 2023.

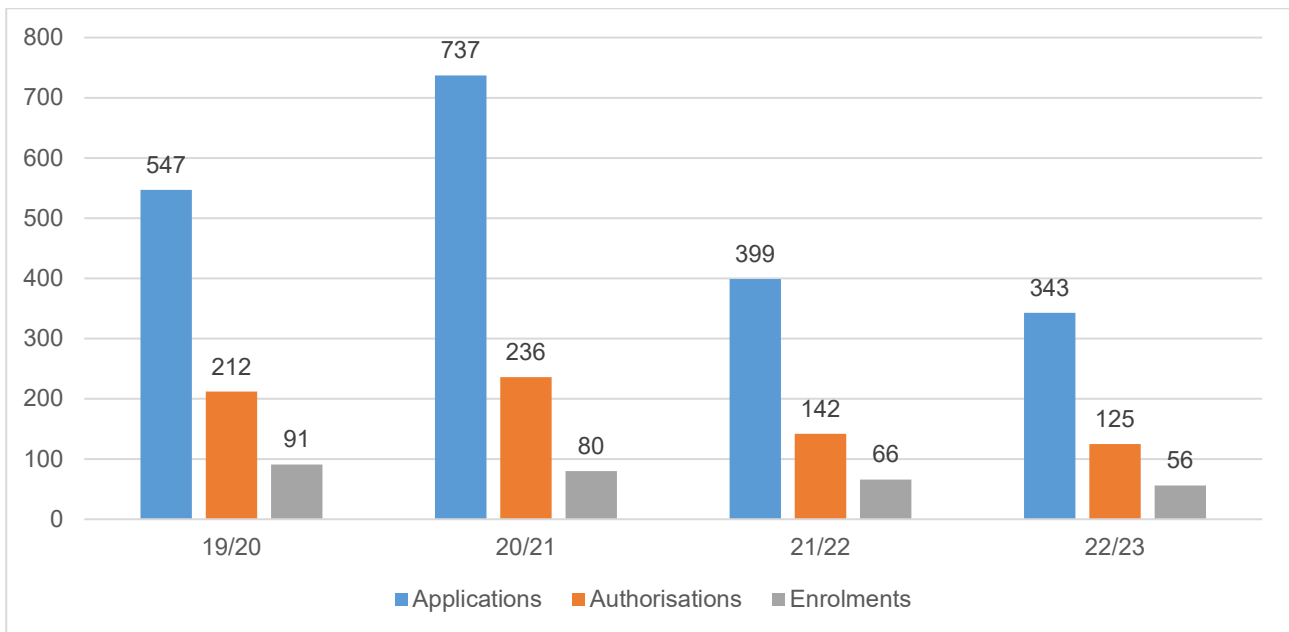


Figure 1: Applications and first-year student numbers B.Sc. Life Sciences Nutrition

With the abolition of the numerus clausus (NC) in the winter semester 2021/22, the number of applicants fell from 737 to 399. While there was a fixed number of study places to be allocated in the 2019/20 and 2020/21 winter semesters as part of the NC procedure with a succession procedure and the enrolment figures were 91 and 80 enrolled students respectively in accordance with the admission regulations, the number of enrolled students fell to 66 in the 2021/22 winter semester with the introduction of the aptitude assessment procedure. While a fixed number of study places was determined in the NC procedure based on a capacity calculation, all "suitable" applicants receive a study place in the aptitude assessment procedure. Due to the nevertheless limited resources, in particular due to a high proportion of practical and laboratory work, the target number is an annual cohort of 60-70 new students.

One reason for the decline in applications could be the change in the admission procedure.

With the introduction of an aptitude test (online tests) in the 2nd stage of the procedure, standardized and comparable admission conditions were created. The aim of the aptitude assessment procedure (EfV) is to keep the drop-out rate in the degree program low by selecting applicants who are suitable for the B.Sc. in Life Sciences Nutrition on the basis of their particular qualifications.

## 4 Demand Analysis

Food has become much more than just food. Increasing food intolerances are countered by a rapidly growing demand for functional and convenience foods. The effect of nutrition and food ingredients on the human metabolism is a central topic for health promotion and the prevention of civilization diseases. This is why qualified nutritionists are needed who can combine the fundamentals and findings of modern nutrition research with those of human medicine, food science and public health in an interdisciplinary manner and who can meet the scientific and health policy challenges. In addition, global climate change is creating an increasingly urgent need for sustainable global food security. Modern nutritional science also has to face up to this challenge.

The Bachelor's degree is a professional qualification and enables direct entry into a career. The knowledge acquired in modern nutritional research qualifies graduates to work in research, nutritional medicine and industrial food production. The field of activity ranges from clinical research to product development and public health education. There are also a wide range of career opportunities in the field of food safety and in advising public and private healthcare providers with a special focus on personalized nutrition.

Occupational fields in which graduates of the Bachelor's degree program in Life Sciences Nutrition are likely to work:

- Food industry
- Pharmaceutical industry
- Research institutes/universities
- Institutions/associations/ministries/schools/educational institutions
- Health/fitness industry/clinics

The food and pharmaceutical industries often require further qualifications with a focus on research, which can only be acquired on a Master's degree program. The majority of Bachelor's students therefore plan to complete a Master's degree program before starting their Bachelor's degree. This is also shown by the study program survey from 2022, with around 74% of those surveyed planning to take up a Master's degree program after the B.Sc. in Life Sciences Nutrition. The research orientation of the Bachelor's degree program in Life Sciences Nutrition is aimed at further education through a Master's degree program in order to qualify for the job market or a subsequent doctorate.

The broad education in the natural and biological sciences as well as the individually selectable differentiation within the elective area in the direction of *Molecular Nutrition Physiology, Food and Technologies, Nutritional Medicine and Public Health* during the Bachelor's program makes it possible to apply for the English-language Master's program Nutrition and Biomedicine at the TUM School of Life Sciences or to opt for a Master's program in a field related to Life Sciences Nutrition such as Molecular Biotechnology, Biology, Food Technology, Public Health, Nutritional Medicine, etc. at TUM or another domestic or foreign university. at TUM or another university in Germany or abroad.

## 5 Competition Analysis

### 5.1 External Competition Analysis

There are around 46 Bachelor's degree programs at 31 German universities, 10 Bachelor's degree programs in Austria, 2 Bachelor's degree programs in Switzerland and 3 distance learning degree programs with very different specializations that are assigned to the field of nutritional science (source: <https://www.studieren-studium.com/studium/studieren?stichwort=Bachelor+Ern%C3%A4hrungswissenschaft&ort=#suche>, 2024)

The course content ranges from medical and biomedical research-oriented specializations to nutrition therapy, nutrition counselling and dietetics to specializations in home economics, nutrition communication and marketing, food management, food science or food and pharmaceuticals as well as fitness.

The University of Hohenheim, the University of Potsdam and the Justus Liebig University Giessen, for example, have a similar research-orientated focus to TUM.

There are six related degree programs in Bavaria, but they all have a fundamentally different focus, as the following table shows.

Table 1: Overview of Bachelor's degree programs in the food and nutrition sector in Bavaria (excluding Master's and teacher training programs)

| University  | Study program                     | Conclusion                 | Location                          | Fields of study   |
|---|-----------------------------------|----------------------------|-----------------------------------|---|
| Technical University Munich                                     | Food chemistry                    | Bachelor of Science, B.Sc. | Garching, Freising                | Nutritional science, food technology, microbiology, toxicology  |
| University Bayreuth   | Food and Health sciences          | Bachelor of Science, B.Sc. | Bayreuth                          | Nutritional science, Health science, Sustainability sciences (economic), Jurisprudence, Law   |
| Weihenstephan-Triesdorf University of Applied Sciences, HSWT    | Nutrition and supply management   | Bachelor of Science, B.Sc. | Triesdorf                         | Nutrition and health, quality, Development and product management of food, supply management  |
|   | Organic food & Business           | Bachelor of Science, B.Sc. | Freising                          | Sustainability and climate protection as well as organic food: Nutritional science, Food technology, Marketing, sales, Sustainability sciences (economic), Economics, economics |
| Fresenius University of Applied Sciences                        | Nutrition & fitness in prevention | Bachelor of Science, B.Sc. | Hamburg, Idstein, Cologne, Munich | Health science: Coaching and communication, Nutritional sciences, basic knowledge of business administration, Sports science  |
| DHGS German University of Applied Sciences for Health and Sport | Life Coaching                     | Bachelor of Science, B.Sc. | Berlin, Ismaning, etc.            | Coaching, Nutritional science, Sport  |

Source: Own presentation according to <https://www.hochschulkompass.de/home.html>, 2023

This makes it clear that the Bachelor's degree program in Life Sciences Nutrition at TUM is the only degree program in Bavaria with a scientific and research-oriented focus in the areas of: Bio-medicine, Food Science and Public Health Nutrition. The proportion of (laboratory) practicals and exercises is relatively high at around 40%, which emphasizes the practical and research orientation of the course.

The scientific focus on nutrition-related diseases (e.g. obesity, diabetes, intestinal diseases), which affect large sections of the population, as well as the interface between nutritional medicine as a connecting element between nutritional science, biomedical research and nutritional medical care in clinics are also special features of this degree program. Not all universities enjoy the advantage of having a medical faculty on site or the advantage of close collaborative research and a joint teaching program with medicine in some areas.

## 5.2 Internal Competition Analysis

At the TUM School of Life Sciences there is no similar or related degree program in the field of nutrition on a natural science basis. There is therefore no competition with other degree programs or a crowding-out effect compared to other degree programs at TUM. Life Sciences Nutrition deals with the absorption and effect of nutrients in the human body and investigates how nutrition promotes health and can be used in the treatment of diseases. The focus is on the human organism. This distinguishes the Bachelor's degree program in Nutritional Science from the related Life Science degree program at the TUM School of Life Sciences and TUM.

Table 2: Differentiation from "related" degree programs at TUM

| <b>Study program TUM</b>   | <b>Areas of overlap with the Bachelor's degree program in Life Science Nutrition</b>   | <b>Demarcation</b>   |
|--|--|--|
| Medicine (TUM School of Medicine and Health)                                 | The human organism takes centre stage; scientific principles; nutritional medicine; anatomy, physiology, clinical studies; investigation of nutrition-related diseases | Nutritionists are not medical doctors and cannot provide medical treatment for illnesses   |
| Bachelor's degree program in Food Technology (TUM School of Life Sciences)   | Scientific basics; food technology   | The production and processing of food (food quality) does not play a role in the B.Sc. in Life Science Nutrition.  |
| Bachelor's degree program in Food Chemistry (TUM School of Natural Sciences) | Scientific basics; food chemistry, microbiology, toxicology  | The focus is on healthy and safe foods with no effect on the human organism;<br>The production, processing and treatment of food play a minor role in the B.Sc. in Life Science Nutrition. |

Source: Own presentation, 2023

## 6 Program Structure

### 6.1 Curriculum

The Bachelor's degree program in Life Sciences Nutrition comprises a standard period of study of 6 semesters, including the Bachelor's thesis. A total of 180 ECTS credits must be earned within the framework of modules.

The Bachelor's degree program consists of:

- 19 **required modules** (128 credits).

WZ0702 Fundamentals of Human Nutrition from the required modules is a **cliff module** (5 credits) which must be passed by students by the end of the 2nd semester.

- the **Bachelor's thesis** (12 credits),
- **Elective modules** totaling 40 credits, of which 6 CP must be earned in modules from the interdisciplinary qualifications and 34 CP in modules from the list of specialist qualifications.

Figure 2: Curriculum of the Bachelor's degree program in Life Sciences Nutrition

| Semester |   |  |  |  |  |  | Credits/<br>Exams |
|----------|---|--|--|--|--|--|-------------------|
| 1.       | CH0142<br>General and Inorganic Chemistry with Laboratory Course (required)<br>K<br>10 CP                 | LS40022<br>Basics in Human Nutrition (required)<br>K<br>5 CP         | MA9601<br>Advanced Mathematics und Statistics (required)<br>K<br>5 CP                  | PH9034<br>Physics for Life Sciences (required)<br>K + LL<br>7 CP   | CLA30230<br>Ethics and Responsibility (ÜFQ)<br>W<br>3 CP                               |  | 30/<br>6 P        |
| 2.       | WZ0128<br>Introduction to Genetics und Cell Biology (required)<br>K<br>6 CP                               | WZ0022<br>Human and Animal Physiology (required)<br>K<br>6 CP        | CIT5130005<br>Introduction to Stochastic Models and Statistics (required)<br>K<br>5 CP | WZ0013<br>Organic Chemistry (required)<br>K<br>3 CP  | NAT0144<br>Physical Chemistry with Chemical Laboratory Course (required)<br>K<br>7 CP  | SZ0488<br>English - gateway to English master's C1 (ÜFQ)<br>PF<br>3 CP | 30/<br>6 P        |
| 3.       | LS40000<br>Introduction to Microbiology (required)<br>K + LL (SL)<br>5 CP                                 | LS40007<br>Special Physiology of Nutrition (required)<br>M<br>10 CP  | LS40005<br>Food Chemistry (required)<br>(3 CP)   | WZ0130<br>Introduction to Biochemistry and Metabolomics (required)<br>K<br>(4 CP)  | LS40019<br>Nutritional Physiology of Macro- and Micronutrients (required)<br>K<br>8 CP |  | 30/<br>5 P        |
| 4.       | WZ3107<br>Biofunctionality of Food (required)<br>K<br>5 CP  | LS40020<br>Experimental Nutritional Sciences (required)<br>M<br>9 CP |  |  | WZ3118<br>Nutritional Medicine and Clinical Studies (required)<br>K<br>5 CP            |  | 30/<br>6 P        |
| 5.       | LS40021<br>Integrative Nutrition Sciences (required)<br>(6 CP)  | WZ3095<br>Biostatistics (required)<br>M<br>5 CP                      | WZ2457<br>Neurobiology (elective)<br>K<br>3 CP   | WZ3119<br>Pediatric Nutritional Medicine (elective)<br>C + PRÄ (SL)<br>5 CP  | SG160036<br>Health Behavior and Prevention (elective)<br>K<br>6 CP                     | LS30046<br>Introduction to Food Technology (elective)<br>K<br>5 CP     | 30/<br>6 P        |
| 6.       |   | WZ3111<br>Public Health Nutrition (elective)<br>M<br>5 CP            | LS40006<br>Research Internship (elective)<br>B<br>5 CP                                 | LS40001<br>Food Microbiology and Food Legislation (elective)<br>K<br>5 CP  | WZ3024<br>Bachelor's Thesis<br>W<br>12 CP  |  | 30/<br>6 P        |
| Legend   | Dark blue = required Bachelor's thesis module<br>Light blue = elective modules<br>Grey = required modules |  |  | PR = practical course; CP = credit points; SL = academic achievement, K = written examination; M = oral examination; LL = laboratory achievement;<br>B = report; LL = laboratory achievement; ÜL = exercise achievement; P = project work; PF = portfolio; PRÄ = presentation; W = scientific paper; ÜFQ = interdisciplinary qualification |  |  |                   |

## 6.2 Modules

The required part of the Bachelor's degree program in Life Sciences Nutrition is made up of basic science and mathematics modules across all degree programs as well as specific modules that build on these and provide students with both specialist nutritional science knowledge and methodological skills (exercises, laboratory practicals, etc.). In the elective area, students are given the opportunity to build up an individual profile, either within one or more specializations or also broadly across the entire range of elective modules.

The Life Sciences Nutrition degree program imparts knowledge of the inorganic and organic chemistry of micro- and macronutrients, the effects of technological processes on food content and quality, the analytical methods of food chemistry, the microbiological aspects of food safety, the biochemical and cell biological processes of digestion, absorption and metabolization of food ingredients and the physiological effects of all these processes on human nutrition and health.

### Required modules

In the **first two semesters** (first phase) of the Bachelor's degree program in **Life Sciences Nutrition**, students receive an introduction to the basics of human nutrition and human and animal physiology with a focus on nutritional physiology in addition to a basic education in the natural and life sciences. The first two semesters serve both to train basic life science skills and to establish a professional identity in nutritional science. The fundamentals of human nutrition and human and animal physiology deal with human nutritional requirements, how food is digested, absorbed, distributed and metabolized in the body, and the organ systems and regulatory circuits involved. This phase of the Bachelor's degree program forms the orientation phase, which enables students to explore the breadth of the life science disciplines. The promotion of permeability at the beginning of the degree program is a competitive advantage compared to other locations. It supports the recruitment of students with the highest possible motivation for their chosen specialization.

The module Fundamentals of Human Nutrition (first semester) is of particular importance as a 'cliff module' according to §38 of the FPSO of the degree program. Passing this module by the end of the second semester is a prerequisite for continuing the degree program.

In the basic modules Physics for Life Sciences (first semester) and Fundamentals of Microbiology (third semester) in this area, two examinations are required, as different forms of examination are needed to test the specialist knowledge acquired in the lecture and methodological competence or the laboratory work of the exercises.

In the Higher Mathematics module, students refresh their knowledge from school and, in particular, lay the foundations for the statistical evaluation of experimental results. Students also learn how to confidently handle various methods of visualizing variable data as used in the scientific literature.

In the **third and fourth semesters** (second phase), nutritional science expertise is further expanded and deepened, including methodological and technical aspects in practical exercises. Knowledge of the nutritional requirements in different phases of human life and the influence of nutrition on the development, prevention, progression and remission of diseases is also added. This in-depth specialist training in nutritional science, nutritional physiology and nutritional medicine is accompanied by modules in microbiology, biochemistry and food chemistry. Building on this, the teaching of clinical nutritional medicine deals with how these findings can be applied for adequate nutrition in the treatment of sick people. The course content includes new nutritional interventions, personalized nutritional concepts and foods with bioactive ingredients (functional foods and nutritional medicine),



which are currently the subject of research at universities, public research institutions and in the food industry and will enable alternative lifestyle interventions and nutritional therapies in the future.

The modules Fundamentals of Biochemistry and Energy Metabolism and Food Chemistry extend over two semesters in order to better distribute the high volume of interrelated theoretical and practical teaching content. At the same time, the modules include two examinations in order to equalize the examination load for the students on the one hand and to be able to offer different forms of examination according to the course at the end or during the semester on the other.

The **fifth and sixth semesters** (third phase) serve on the one hand to develop an individual competence profile according to inclinations and interests (elective modules) and on the other hand to bring together all the specialist and methodological skills learnt and to prepare for the academic thesis.

In the required module Seminar in Integrated Nutritional Science in the fifth and sixth semesters, the focus is on recapitulating, networking and applying the knowledge and methods acquired in order to promote an integrative and interdisciplinary view of nutritional science. The Integrated Nutritional Science seminar module extends over two semesters in order to give students time to familiarize themselves with the special topics of their projects, form teams, work in groups, carry out further research and summarize their research results, in addition to teaching them basic skills in scientific working and presentation methods. During the current summer semester, students will work on and present their findings on a current nutritional science topic as part of a project. In the oral examination at the end of the summer semester, students demonstrate their individual ability to explain scientific results and discuss them in the broader context of nutritional science.

To prepare for the statistical methods required in the Bachelor's thesis, the 5th semester also includes the required module Biostatistics.

## **Bachelor's Thesis**

The Bachelor's degree program concludes with an academic thesis lasting three months (12 credits). As a rule, Bachelor's students work on one aspect of the current research activities of a department or external research institutions. The topics cover the interdisciplinary spectrum of nutritional science and can be freely chosen by the students in consultation with the respective supervisor.

## **Elective modules**

Modules totaling 40 credits must be completed here.

In the fifth and sixth semesters, elective modules from List 1: Specialist qualifications totaling 34 credits must be completed. These allow students to individually focus and deepen their skills profile. The combination of different elective modules and self-directed learning promotes flexibility in terms of time and place, mobility and internationalization.

Students are free to choose modules from the following lists:

- 1.1 Molecular nutritional physiology
- 1.2 Food and technology
- 1.3 Nutritional medicine and public health
- 1.4 Free elective modules Life Sciences Nutrition

In the area of free elective modules (list 1.4), for example, a research internship at a chair or an institution outside TUM can be taken. In the same way, business skills or training in data science etc. can also be introduced as a useful addition to the natural and life sciences subjects of the degree program through elective modules and provide additional professional qualifications. Or you can choose modules from other life sciences degree programs, such as agricultural sciences, which are closely related to nutritional science and add a related subject area to nutritional science.

The individual selection of elective modules enables a broad-based education as well as specialization in one or more areas of specialization. At the same time, it is possible to acquire further professional skills from other subject areas.

In all elective areas, it is also possible to apply to the Examination Board to have modules from other universities recognized, e.g. as part of a stay abroad, provided they meet the requirements of the Bachelor's degree program in Life Sciences Nutrition.

However, since specialized knowledge is often not the sole selection criterion for entry into professional life, future graduates of Life Sciences Nutrition should be given the opportunity to acquire qualifications at an early stage that go beyond pure specialized knowledge (e.g. foreign languages). Therefore, in the first two semesters, modules in the area of List 2: Interdisciplinary qualifications amounting to 6 credits must be completed. This area includes the courses offered by the Carl-von-Linde-Akademie, the TUM Language Centre and other interdisciplinary modules at TUM and the TUM School of Life Sciences.

### **6.3 Stays abroad as part of the Degree Program**

The 5th semester is recommended for a stay abroad on the Bachelor's degree program in Life Sciences Nutrition. Within this mobility window, 30 credits can be earned during a stay at a foreign university.

In the fifth semester, a stay abroad is easily feasible, as mainly elective modules must be taken. Elective modules that are acquired at another university as part of the stay abroad can also be credited if there is no corresponding module in the module catalogue of the Technical University of Munich, but the other requirements correspond to those of the Bachelor's degree program in Life Sciences Nutrition.

For the selection and recognition of elective modules from abroad, the Student Advisory Service team at the Weihenstephan Campus Office of the TUM School of Life Sciences offers information and assistance in finding suitable modules that correspond to the subject identity of Life Sciences Nutrition and can be recognized.

The Biostatistics module can be found in the range of modules offered by almost all universities that offer natural science degree programs such as the B.Sc. in Life Sciences Nutrition and is therefore not an obstacle to a stay abroad. The required module Seminar in Integrated Nutritional Science can also be taken during a stay abroad, as it is offered in hybrid form (in presence and virtually) and consists largely of self-organized group work, which can also take place virtually or in hybrid form.

The "International Student Affairs" office, which is part of the Student Counselling team, also supports students going abroad (outgoings) with basic information on planning their stay abroad.

Students on the Bachelor's degree program in Life Sciences Nutrition at the TUM School of Life Sciences can take advantage of the following funding programs for their stay abroad:

#### Within Europe

- Erasmus + (Study)
- EU Erasmus+ (internship)
- EU SEMP Switzerland
- Athens EU

#### Worldwide

- TUM Exchange
- Erasmus+ (International Dimension)
- TUM without borders
- Scholarship abroad (internships and self-organized study visits)

#### Other

- PROMOS (final theses and seminar papers)
- PROMOS (TUMexchange applicants)
- PROMOS (study and competition trips)

All information on the programs, partner universities etc. is available to students on the Campus Office website under International Affairs.

<https://www.ls.tum.de/ls/internationales/outgoings/>

## 7 Organization and Coordination

The Bachelor degree program Life Sciences Nutrition is offered by the TUM School of Life Sciences.

Administrative aspects of study organization are partly the responsibility of the central departments of the TUM Center for Study and Teaching (TUM CST) and partly of the TUM School of Life Sciences (see overview below):

- Student counselling: Student Advising and Information Services (TUM CST)  
[studium@tum.de](mailto:studium@tum.de)  
+49 (0)89 289 22245  
Provides information and advising for prospective and current students  
(via hotline/service desk)
- Departmental Student Advising: Susanne Papaja-Hülsbergen  
[agriculturalsciences.co@ls.tum.de](mailto:agriculturalsciences.co@ls.tum.de)  
+49 (0)8161 71 3781
- Academic Programs Office (within department/school), Infopoint, etc.: Campus Office Weißenstephan  
[campus.office@ls.tum.de](mailto:campus.office@ls.tum.de)
- Study Abroad Advising/Internationalization: TUM-wide: TUM Global & Alumni Office  
[internationalcenter@tum.de](mailto:internationalcenter@tum.de)  
Departmental: Campus Office Weißenstephan  
[international.co@ls.tum.de](mailto:international.co@ls.tum.de)
- Gender Equality Officer:: Prof Aphrodite Kapurniotu  
[akapurniotu@mytum.de](mailto:akapurniotu@mytum.de)
- Advising – Barrier-Free Education: TUM-wide: Service Office for Disabled and Chronically Ill Students (TUM CST),  
[handicap@zv.tum.de](mailto:handicap@zv.tum.de)  
+49 (0)89 289 22737
- Admissions and Enrollment: Application and Enrollment (TUM CST)  
[studium@tum.de](mailto:studium@tum.de)  
+49 (0)89 289 22245  
Application, enrollment, Student Card, leave of absence, re-registration, de-registration
- Semester Fees and Scholarships:: Fees and Scholarships (TUM CST)  
[beitragsmanagement@zv.tum.de](mailto:beitragsmanagement@zv.tum.de)  
Scholarships and semester fees
- Examination Office: Graduation Office and Academic Records (TUM CST)  
Graduation documents, notifications of examination results, preliminary degree certificates

- Departmental Examination Office:: TUM School of Life Sciences;  
Campus Office Weihenstephan  
Examination Affairs Team  
[examination.co@ls.tum.de](mailto:examination.co@ls.tum.de)
- Examination Board: Prof Dr Kurt-Jürgen Hülsbergen (Chairman)  
Susanne Minges (Secretary)
- Quality Management: TUM-wide: Quality Management  
(TUM CST)  
<https://www.tum.de/studium/tumcst/teams-cst/>  
Departmental: Campus Office Weihenstephan  
Quality Management Team  
[qm.co@ls.tum.de](mailto:qm.co@ls.tum.de)  
Organization of QM circles, evaluation, coordination  
module management

## 8 Enhancement Measures

In the Life Sciences Nutrition degree program, internal and external quality circles were held regularly with student participation. Numerous courses were also evaluated by the participants and feedback meetings were held between the APD and students. The results of these meetings and the resulting changes were implemented on an ongoing basis or incorporated into the existing documents for the reaccreditation of the degree program. Student suggestions were incorporated into the ongoing optimization of practiced concepts for the further development of the degree program.

The **required area** was increased by 4 credits to a total of 128 credits. The reasons for this are the separation of the *Higher Mathematics and Statistics* module (7 CP) into the two modules *Higher Mathematics 1* (5 CP) and *Introduction to Stochastic Models and Statistics* (5 CP) to strengthen statistics training and the adjustment of modules to the workload, e.g. *Seminar Integrated Nutritional Science* (increase from 8 to 9 CP).

In future, there will only be one **cliff module** *WZ0702 Fundamentals of Human Nutrition* (1st semester), which must be passed by the end of the 2nd semester. *Fundamentals of Human Physiology* (2nd semester) has been cancelled as a cliff module in order to ensure that the examination can be repeated.

**Restructuring of the range of elective modules:** In order to better orientate students' skills and goals and to sharpen the profile of graduates, the elective modules on offer have been organized according to overarching subject areas. These are now assigned to one of the following three subject areas: **Molecular Nutritional Physiology, Food and Technologists**, and **Nutritional Medicine and Public Health**. This also corresponds to the recommendation of the eQMZ for the establishment of specializations and, among other things, the inclusion of modules with food technology aspects. By dividing the elective modules into the 4 lists, the areas of specialization are visibly displayed in the transcript of records (final document). A total of 34 credits can be freely selected from the range of elective modules. By cancelling the previous requirements, students have more flexible options for profiling.

**Interdisciplinary qualification:** In future, 6 credits must be earned in this area. This is 3 CP less compared to the previous regulations (general education, 9 CP).

**Reduction in examination density at the end of the 4th semester:** Up to now, the module examinations for the two two-semester modules *Experimental Nutritional Research and Nutritional Physiology of Macro- and Micronutrients* were held at the end of the 4th semester. In future, the module *Nutritional Physiology of Macro- and Micronutrients* will be offered as a one-semester module in the 3rd semester, so that the examination will take place at the end of the 3rd semester, thus relieving the examination period in the 4th semester.

**Increase in the proportion of oral examinations:** **Oral examinations** have been introduced in the two required modules *Specialized Physiology of Nutrition* and *Experimental Nutrition Research*, among others. *Oral examinations provide a better opportunity to assess whether students have recognized the interrelationships of the examination area and whether specific questions can be placed in these contexts. The change in the form of examination also meets the students' desire for increased use of different forms of examination and at the same time offers good preparation for the oral module examination in the Integrated Nutritional Science Seminar module.*

**Introduction of mid-term examinations:** Students criticized the fact that coursework completed during the course (ungraded) has no influence on the module grade. In order to better honor the effort of previous study achievements, mid-term achievements can be completed with the option to improve grades.

The preparation of a poster and presentation in the module *Nutritional Physiology of Macro- and Micronutrients* will in future be honored as a voluntary mid-term achievement and can be used to improve grades. Similarly, the preparation of protocols in the Fundamentals of Human Nutrition and Experimental Nutrition Research exercises will in future be honored as a voluntary mid-term achievement. Overall, the introduction of these mid-term achievements promotes student motivation and allows for individualized feedback: both are core aspects of the TUM's teaching and learning constitution.

**Innovation and digitalization:** In some modules, an electronic examination via the new examination platform exam.moodle.tum.de is currently possible in presence as an alternative. This allows lecturers to adapt examination scenarios to the respective cohort size and other circumstances and also meets the students' desire for greater digitalization of teaching and learning. The practice established during the pandemic of offering lectures in hybrid format (in the lecture theatre and streamed in parallel) has also proven to be very beneficial. Individual functions of Moodle are now also used, for example, for the punctual submission and annotated return of paperless protocols in the Experimental Nutrition Research and Fundamentals of Human Nutrition tutorials.

In the course of digitalization, an online test was already introduced in the second stage of the aptitude assessment procedure in the last amendment to the statutes to ensure comparability of the admission requirements.

**Graduation ceremony:** In 2023, a farewell ceremony was held for the first time for graduates of the Life Sciences Nutrition degree program. It included the awarding of prizes for the best theses and a presentation by a former graduate of the degree program, who spoke about his entry into professional life. The event was held together with the graduation ceremony for the Master's degree program in Nutrition and Biomedicine. This format is to be retained because it presents students with prospects for their future careers and strengthens the team spirit, which takes a back seat in the final year of study due to the individualization of the course (elective modules, mobility windows, final theses).