This is a translation of the German original.
In the event of any discrepancy, the German text prevails.

**OFFICIAL TRANSLATION OF**

# Fachspezifische Bestimmungen für den Studiengang „Molecular Plant Science (M.Sc.)“

**vom 24. Mai 2023**

## (Amtliche Bekanntmachung Nr. 93 vom 03. November 2023)

**THIS TRANSLATION IS FOR INFORMATION ONLY – ONLY THE GERMAN VERSION SHALL BE LEGALLY VALID AND ENFORCEABLE!**

# Subject-Specific Provisions for the Master of Science (MSc) in Molecular Plant Science

**dated 24 May 2023**

On 29 August 2023 in accordance with Section 108 subsection 1 of the Hamburg higher education act (Hamburgisches Hochschulgesetz, HmbHG) dated 18 July 2001 (HmbGVBl. p. 171) and amended 17 June 2021 (HmbGVBl. p. 468), the Executive University Board of Universität Hamburg ratified the Subject-Specific Provisions for the Master of Science in Molecular Plant Science adopted on 24 May 2023 by the Faculty of Mathematics, Informatics and Natural Sciences in accordance with Section 91 subsection 2 number 1 HmbHG.

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# Preamble

These subject-specific provisions supplement the provisions of the Faculty of Mathematics, Informatics and Natural Sciences Examination Regulations for Master of Science Degree Programs dated 20 October 2021 as amended.

## Section 1
## Program and examination objectives, academic degree, and implementation of the degree program

**Section 1 subsection 1:**

The English-language MSc in Molecular Plant Sciences (MoPS) is a research-oriented degree program that builds on basic molecular biology knowledge. Graduates have obtained expanded knowledge of molecular biological, physiological, biochemical, and visualization methods for plant research and are able to apply these independently. They possess the ability to formulate hypotheses based on problem analysis and to develop experiments to test these hypotheses using the methods learned. They have comprehensive experience in conducting experiments, as well as in error analysis and rectification, and can present and critically discuss the results of experiments in scientific contexts. Graduates have gained extensive practical experience in university research operations and have been introduced to alternative career paths. Graduates are familiar with the current discourse on molecular biological methods and are able to contribute to debates in social contexts with their professional knowledge.

## Section 4
## Program and examination structure, Modules and ECTS credits

**Section 4 subsection 1:**

In order to complete the degree program, 72 ECTS credits must be completed from the curriculum in the required area, and 48 ECTS credits must be completed from the curriculum in the required elective area. An overview of modules has been provided in a table attached as an appendix to the subject-specific provisions. A detailed description of the modules can be found in the module catalog for the degree program.

| Module | | ECTS credits |
|---|---|---|
| | **First semester** | |
| | Introduction to Molecular Plant Science | 5 ECTS credits |
| | Introduction to Lab Methods A: Basic Molecular Biology and Protein Biochemistry | 10 ECTS credits |
| | Introduction to Lab Methods B: Plant Stress Responses | 10 ECTS credits |
| | Introduction to Lab Methods C: Molecular and Cellular Analyses of Phenotypes | 5 ECTS credits |
| | Second semester | |
| | Ethics in Biology | 6 ECTS credits |
| | Required elective modules | 24 ECTS credits |
| | Third semester | |
| | Introduction to Job | 6 ECTS credits |
| | Required elective modules | 24 ECTS credits |
| | Fourth semester | |
| | Master's thesis | 30 ECTS credits |

Required elective modules may only be taken after successfully completing the required modules Introduction to Lab Methods A, B, and C and attending the seminar Introduction to Molecular Plant Science.

**Section 4 subsection 3:**
The final module is comprised of the master's thesis (27 ECTS credits) and an oral examination (3 ECTS credits). The oral examination should be taken no later than six weeks after submission of the master's thesis.

**Section 5**
**Course types**

Courses are held in English.

**Section 13**
**Completed coursework and module examinations**

**Section 13 subsection 6:**
The examinations are held in English.

## Section 14
## Master's thesis

**Section 14 subsection 2:**
An application for permission to begin work on the master's thesis may only be made once the required elective area has been successfully completed.

**Section 14 subsection 4:**
The master's thesis must be written in English.

**Section 14 subsection 5:**
The work required in the final module amounts to 30 ECTS credits, which is comprised of a master's thesis (27 ECTS credits) and an oral examination (3 ECTS credits). The time period to complete the work is six months.

**Section 14 subsection 7:**
At least one examiner of the master's thesis must belong to the group of university teachers in the Department of Biology and be significantly involved in teaching within the degree program. As a rule, the other examiner for the master's thesis must belong to the Department of Biology and be significantly involved in teaching within the degree program. In case of doubt, the examinations board decides the applicable regulations for examination and instructions.

## Section 15
## Evaluation of examinations

**Section 15 subsection 3:**
All modules are graded differentially except for the module Introduction to Job, which is only graded as a pass or fail. In the overall final grade, each of the required elective modules shall be weighted 15 percent; the module Ethics in Biology, 10 percent; the results of the examination from the first semester module, 10 percent; and the master's thesis, 50 percent.

## Section 23
## Effective date

These subject-specific provisions become effective on the day following official publication by Universität Hamburg. They first apply to students commencing their studies in Winter Semester 2024/25.

Hamburg, 03 November 2023
**Universität Hamburg**

**Tabular Appendix to the Subject-Specific Provisions for the Master of Science in Molecular Plant Science**

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| | | | | | | | **Courses** | | | | **Examinations** | | | | | |
| **Semester offered** | **Recommended semester** | **Module duration** | **Module prerequisites** | | **Module type: Required (Req.), Required Elective (RE), or Elective (E)** | **Module number/code** | **Module** | **Course title** | **Course type** | **SWS** | **Prerequisites for admission to examination** | **Type of examination** | | **Graded** | **ECTS credits** |
| Winter semester | 1 | 1 | | None | Req. | MoPS-01 | **Introduction to Molecular Plant Science** | | | | Presentation | **Written examination (100%)** | | Yes | 5 |
| | | | | | | | | Introduction to Molecular Plant Science | L | 2 | | | | | |
| | | | | | | | | Introduction to Molecular Plant Science | S | 2 | | | | | |
| **Intended learning results:** Students are familiar with the current topics of molecular plant sciences, in particular plant physiology, plant developmental biology, plant genetics, and infection biology. | | | | | | | | | | | | | | | | |
| Winter semester | 1 | 1 | | None | Req. | MoPS-02 | **Introduction to Lab Methods A: Basic Molecular Biology and Protein Biochemistry** | | | | | **Completion of two lab reports (50% each)** | | Yes | 10 |
| | | | | | | | | Lab Methods in Molecular Plant Science — Course A1 | Req. | 4 | | | | | |
| | | | | | | | | Lab Methods in Molecular Plant Science — Course A2 | Req. | 4 | | | | | |

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| **Intended learning results:** Students have obtained practical knowledge of the current research methods in molecular biology, protein chemistry, and mass spectrometry. In addition, they have acquired the skills to develop hypothesis-based test concepts and to analyze datasets statistically. They have learned how to document and present their findings adequately. | | | | | | | | | | |
| Winter semester | 1 | 1 | None | Req. | MoPS-03 | **Introduction to Lab Methods A: Basic Molecular Biology and Protein Biochemistry** | | | **Completion of two lab reports (50% each)** | Yes | 10 |
| | | | | | | Lab Methods in Molecular Plant Science—Course B1 | Req. | 4 | | | |
| | | | | | | Lab Methods in Molecular Plant Science—Course B2 | Req. | 4 | | | |
| **Intended learning results:** Students have obtained deep insight into experimental methods and research processes in the field of molecular plant biology and biochemistry. They are able to apply their knowledge to scientific questions. They have acquired advanced knowledge of molecular biology and modern plant sciences, particularly in the fields of molecular biology, biochemistry, analysis, mass spectrometry and computer-supported analysis and have learned to recognize scientific problems, formulate hypotheses, and design appropriate experiments to test these hypotheses and ultimately solve problems. Moreover, they are be able to adequately document and actively present their scientific work. | | | | | | | | | | |
| Winter semester | 1 | 1 | None | Req. | MoPS-04 | **Introduction to Lab Methods C: Molecular and Cellular Analyses of Phenotypes** | | | **Lab report (100%)** | Yes | 5 |
| | | | | | | Lab Methods in Molecular Plant Science—Course C | Req. | 4 | | | |
| **Intended learning results:** Students have acquired practical knowledge of current research methods in cellular biology, molecular biology, and genetics to study *Arabidopsis* and *Zea mays*. In addition, they have acquired the skill to develop hypothesis-based test concepts and to statistically analyze datasets. They have learned how to document and present their findings adequately. | | | | | | | | | | |
| Summer semester | 2 | 1 | None | Req. | MoPS-05 | **Ethics in Biology** | | | **Presentation (100%)** | Yes | 6 |
| | | | | | | Ethics in Biology | L | 2 | | | |
| | | | | | | Ethics in Biology | S | 2 | | | |

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| **Intended learning results:** Students are familiar with different ethical concepts as the key to understanding why people evaluate new scientific findings and technical innovations differently. They are able to develop, justify, and represent their own position critically, reflectively, and responsibly. They are aware of social governance procedures and opportunities in order to actively participate. | | | | | | | | | | | |
| Summer and winter semesters | 2/3 | 1 | Successful completion of modules MoPS-02 to MoPS-04 and participation in the MoPS-01 module seminar | RE | MoPS-6 | **Lab Course A—Molecular Plant Physiology** | | | **Lab report (40%), presentation (60%)** | Yes | 24 |
| | | | | | | Seminar to Lab Course A | S | 2 | | | |
| | | | | | | Lab Course A | Req. | 14 | | | |
| **Intended learning results:** Students have obtained deeper insights into the latest experimental methods, research processes, and computer-assisted techniques and are able to apply their knowledge to scientific research questions. They have acquired advanced knowledge in various fields, such as molecular biology, biochemistry, protein chemistry, applied bioinformatics, and modern plant sciences focusing on plant biochemistry and infection biology (plant-pathogen interactions). Students have learned to recognize scientific problems, set up hypotheses, and plan and carry out meaningful experiments. They have also been taught how to adequately document and professionally present their scientific work. | | | | | | | | | | | |
| Summer and winter semesters | 2/3 | 1 | Successful completion of modules MoPS-02 to MoPS-04 and participation in the MoPS-01 module seminar | RE | MoPS-7 | **Lab Course B—Molecular Plant Genetics** | | | **Lab report (40%), presentation (60%)** | Yes | 24 |
| | | | | | | Seminar to Lab Course B | S | 2 | | | |
| | | | | | | Lab Course B | Req. | 14 | | | |
| **Intended learning results:** Students have obtained deep insight into experimental methods and research processes in the field of molecular plant biology and biochemistry. They are able to apply their knowledge to scientific questions. They have acquired advanced knowledge of molecular biology and modern plant sciences, particularly in the fields of molecular biology, biochemistry, | | | | | | | | | | | |

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| analysis, mass spectrometry and computer-supported analysis and have learned to recognize scientific problems, formulate hypotheses, and design appropriate experiments to test these hypotheses and ultimately solve problems. Moreover, they are be able to adequately document and actively present their scientific work. | | | | | | | | | | | |
| Summer and winter semesters | 2/3 | 1 | Successful completion of modules MoPS-02 to MoPS-04 and participation in the MoPS-01 module seminar | RE | MoPS-8 | **Lab Course C—Plant Biochemistry and Infection Biology** | | | **Lab report (40%), presentation (60%)** | Yes | 24 |
| | | | | | | Seminar to Lab Course C | S | 2 | | | |
| | | | | | | Lab Course C | Req. | 14 | | | |
| **Intended learning results:** Students have obtained deeper insights into the latest experimental methods, research processes, and computer-assisted techniques and are able to apply their knowledge to scientific research questions. They have acquired advanced knowledge in various fields, such as molecular biology, biochemistry, protein chemistry, applied bioinformatics, and modern plant sciences focusing on plant biochemistry and infection biology (plant-pathogen interactions). Students have learned to recognize scientific problems, set up hypotheses, and plan and carry out meaningful experiments. They have also been taught how to adequately document and professionally present their scientific work. | | | | | | | | | | | |
| Summer and winter semesters | 2/3 | 1 | Successful completion of modules MoPS-02 to MoPS-04 and participation in the MoPS-01 module seminar | RE | MoPS-10 | **Lab Course D—Developmental Biology** | | | **Lab report (40%), presentation (60%)** | Yes | 24 |
| | | | | | | Seminar to Lab Course D | S | 2 | | | |
| | | | | | | Lab Course D | Req. | 14 | | | |
| **Intended learning results:** Students are familiar with current topics and questions from developmental biology through knowledge of case studies from research projects. Students have learned different scientific approaches such as for example, the construction and testing of hypotheses and undirected experimental approaches. They are familiar with the latest techniques in the field | | | | | | | | | | | |

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| of genetic, molecular, and image-based analysis of mitosis and meiosis as well as DNA damage repair and can apply these techniques independently. Students have learned how to analytically break down scientific problems and design experiments. They are able to document experiments and scientifically present the data obtained. | | | | | | | | | | | |
| Summer and winter semesters | 2/3 | 1 | Successful completion of modules MoPS-02 to MoPS-04 and participation in the MoPS-01 module seminar | RE | MoPS-11 | **Lab Course E—Functional Analysis of Hormone-Mediated Growth Control in Bryophytes and Their Closest Algal Relatives** | | | **Lab report (40%), presentation (60%)** | Yes | 24 |
| | | | | | | Seminar to Lab Course E | S | 2 | | | |
| | | | | | | Lab Course E | Req. | 14 | | | |
| **Intended learning results:** Students are familiar with the latest evolutionary findings on hormonally mediated growth control in plants, from early divergent groups such as mosses and conjugating green algae. They have experience in setting up experiments to examine the molecular and physiological expression of hormonal effects (e.g., bioassays and differential gene expression analysis). The planning and carrying out of reverse-genetic approaches aimed at clarifying the function of previously undescribed genes is also included where appropriate. The project applies modern techniques. Students have learned to independently plan, conduct, interpret, and modify their experiments, particularly the exact and comprehensive documentation and optimal presentation of their results. | | | | | | | | | | | |
| Winter semester | 3 | 1 | None | Req. | MoPS-12 | **Introduction to Job** | | | **Practical examination** | No | 6 |
| | | | | | | Introduction to Job | L | 2 | | | |
| | | | | | | Introduction to Job | PC | 2 | | | |
| **Intended learning results:** Students are able to evaluate scientific literature as well as classify their own findings in a broader scientific context and develop them into a publishable scientific presentation. Using different media and techniques, they are able to convincingly present their scientific findings. They are familiar with how to apply for financial funding to support their research. They have acquired a good overview of the molecular biology profession. | | | | | | | | | | | |
| Summers | 4 | 1 | Required electives must | Req. | MoPS-13 | **Final Module** | | | **Master's thesis (90%) and oral examination (10%)** | Yes | 30 |

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| emest er | be successfully completed. | | |
| **Intended learning results:** Students are able to autonomously compose a thesis in an area of study within the purview of the Master of Science in Molecular Plant Science. They have acquired practical experience in classifying and evaluating their own research against current research on the selected topic and possess problem-solving skills. | | | |