Georg-August-Universität
Göttingen

# Modulverzeichnis

## Doctoral Degree Programme [Promotionsstudiengang] "Mathematical Sciences" - referring to: Promotionsordnung der mathematisch-naturwissenschaftlichen Graduiertenschule der Georg-August-Universität Goettingen - Georg-August University School of Science (GAUSS) - (RerNatO) (Amtliche Mitteilungen I 28/2018 p. 514)

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# Module

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# Übersicht nach Modulgruppen

## I. Doctoral Degree Programme [Promotionsstudiengang] "Mathematical Sciences"

In principle, all the modules listed below can be replaced by modules from the Master's Degree programme in Mathematics, in this case examination and study regulations of the Master’s Degree programme in mathematics apply.

### 1. Research programme

P.Mat.7101: Scientific colloquia and seminars (3 C, 2 SWS)....5

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### 2. Study programme

P.Mat.7201: Advanced studies in a field of research I (6 C, 4 SWS)....7

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### 3. Research seminars

P.Mat.7301: Accompanying seminar: Introduction to research (3 C, 2 SWS)....11

P.Mat.7302: Accompanying seminar: Scientific analysis of research questions (3 C, 2 SWS)....12

P.Mat.7303: Accompanying seminar: Documentation of mathematical issues (3 C, 2 SWS)....13

### 4. Key competencies

P.Mat.7901: Key competencies in university teaching (3 C, 2 SWS)....14

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| **Georg-August-Universität Göttingen**<br>**Module P.Mat.7101: Scientific colloquia and seminars** | 3 C<br>2 WLH |
|---|---|

| **Learning outcome, core skills:**<br>**Learning outcomes:**<br>In this module students learn methods, concepts, theories and applications in mathematical research with particular focus on:<br>• scientific collaboration in a field of research;<br>• workup of scientific presentations attended at a mathematical symposium with external audience.<br>**Core skills:**<br>After having successfully completed the module students will be able to<br>• discuss current research within the frame of scientific, research oriented meetings or courses;<br>• present research results in mathematics to an academic audience. | **Workload:**<br>Attendance time:<br>28 h<br>Self-study time:<br>62 h |
|---|---|

| **Course: Seminar** | 2 WLH |
|---|---|

| **Course assessment: Presentation (appr. 60 minutes) with discussion, not graded** | 3 C |
|---|---|

| **Requirements:**<br>Presentation of complex mathematical topics in current research. | |
|---|---|

| **Admission requirements:**<br>n/a | **Recommended previous knowledge:**<br>n/a |
|---|---|
| **Language:**<br>English, German | **Person responsible for module:**<br>Dean of Studies |
| **Course frequency:**<br>each semester | **Duration:** |
| **Number of repeat examinations permitted:**<br>twice | **Recommended semester:** |
| **Maximum number of students:**<br>not limited | |

**Additional notes and regulations:**
- Permitted are symposia, colloquia, block courses etc. with external audiences.
- Upon request seminars (M.Mat.54**) or 'Oberseminare' (M.Mat.59**) will be acknowledged.

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| **Georg-August-Universität Göttingen**<br>**Module P.Mat.7102: Research activities at scientific colloquia and seminars** | 3 C<br>2 WLH |
|---|---|

| **Learning outcome, core skills:**<br>**Learning outcomes:**<br>In this module students learn methods, concepts, theories and applications in mathematical research with particular focus on:<br>• workup of own research results for the purpose of a presentation in a seminar or at a symposium;<br>• participation in symposia on mathematical research featuring external audiences;<br>• rework scientific presentations attended at a mathematical symposium with external audiences.<br>**Core skills:**<br>After having successfully completed the module students will be able to<br>• discuss current research within the frame of scientific, research oriented meetings or courses;<br>• present own research results in mathematics to external audiences. | **Workload:**<br>Attendance time:<br>28 h<br>Self-study time:<br>62 h |
|---|---|

| **Course: Symposia** | 2 WLH |
|---|---|

| **Course assessment: Presentation (appr. 30 minutes) with discussion, not graded** | 3 C |
|---|---|

| **Requirements:**<br>Presentation of own research results. | |
|---|---|

| **Admission requirements:**<br>n/a | **Recommended previous knowledge:**<br>n/a |
|---|---|
| **Language:**<br>English, German | **Person responsible for module:**<br>Dean of Studies |
| **Course frequency:**<br>each semester | **Duration:** |
| **Number of repeat examinations permitted:**<br>twice | **Recommended semester:** |
| **Maximum number of students:**<br>not limited | |

**Additional notes and regulations:**
- Permitted are symposia, colloquia, block courses etc. with external audiences.
- Upon request seminars (M.Mat.54**) or 'Oberseminare' (M.Mat.59**) will be acknowledged.

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| **Georg-August-Universität Göttingen**<br>**Module P.Mat.7201: Advanced studies in a field of research I** | 6 C<br>4 WLH |
|---|---|

| **Learning outcome, core skills:**<br>**Learning outcomes:**<br>In this module students learn methods, concepts, theories and applications in mathematical research with particular focus on:<br>• deepening of knowledge in their field of specialisation;<br>• knowledge of methodical and thematic structure of their field of research.<br>**Core skills:**<br>After having successfully completed the module students will be able to<br>• apply methods and techniques typical in their field of reasearch;<br>• solve problems in their field of research;<br>• develop stategies for solving problems typical in the field of research and present the solutions found. | **Workload:**<br>Attendance time:<br>56 h<br>Self-study time:<br>124 h |
|---|---|

| **Course: Seminar or lecture course** | 4 WLH |
|---|---|

| **Course assessment: Oral examination (appr. 20 minutes) or written examination (120 minutes) or presentation (appr. 75 minutes), not graded** | 6 C |
|---|---|

| **Requirements:**<br>Proof of advanced knowledge in the area of the doctoral project. | |
|---|---|

| **Admission requirements:**<br>n/a | **Recommended previous knowledge:**<br>n/a |
|---|---|
| **Language:**<br>English, German | **Person responsible for module:**<br>Dean of Studies |
| **Course frequency:**<br>each semester | **Duration:** |
| **Number of repeat examinations permitted:**<br>twice | **Recommended semester:** |
| **Maximum number of students:**<br>not limited | |

**Additional notes and regulations:**
Permitted are summer schools, winter schools and comparable block courses. The following will be acknowledged:

- M.Mat.59** 'Oberseminar on';
- M.Mat.57** 'Special course in ...';
- M.Mat.56** 'Topics in ...';
- M.Mat.54** 'Seminar on ...';
- B.Mat.41**, B.Mat.42**.

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| **Georg-August-Universität Göttingen**<br>**Module P.Mat.7202: Advanced studies in a field of research II** | 3 C<br>2 WLH |
|---|---|

| **Learning outcome, core skills:**<br>**Learning outcomes:**<br>In this module students learn methods, concepts, theories and applications in mathematical research with particular focus on:<br>• deepening of knowledge in their field of specialisation;<br>• knowledge of methodical and thematic structure of their field of research.<br>**Core skills:**<br>After having successfully completed the module students will be able to<br>• apply methods and techniques typical in their field of reasearch;<br>• solve problems in their field of research;<br>• develop stategies for solving problems typical in the field of research and present the solutions found. | **Workload:**<br>Attendance time:<br>28 h<br>Self-study time:<br>62 h |
|---|---|

| **Course: Seminar or lecture course** | 2 WLH |
|---|---|

| **Course assessment: Oral examination (appr. 20 minutes) or written examination (120 minutes) or presentation (appr. 75 minutes), not graded** | 3 C |
|---|---|

| **Requirements:**<br>Proof of advanced knowledge in the area of the doctoral project. | |
|---|---|

| **Admission requirements:**<br>n/a | **Recommended previous knowledge:**<br>n/a |
|---|---|
| **Language:**<br>English, German | **Person responsible for module:**<br>Dean of Studies |
| **Course frequency:**<br>each semester | **Duration:** |
| **Number of repeat examinations permitted:**<br>twice | **Recommended semester:** |
| **Maximum number of students:**<br>not limited | |

**Additional notes and regulations:**
Permitted are summer schools, winter schools and comparable block courses. The following will be acknowledged:

- M.Mat.59** 'Oberseminar on';
- M.Mat.57** 'Special course in ...';
- M.Mat.56** 'Topics in ...';
- M.Mat.54** 'Seminar on ...';
- B.Mat.41**, B.Mat.42**.

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| **Georg-August-Universität Göttingen**<br>**Module P.Mat.7203: Complementary studies** | 3 C<br>2 WLH |
|---|---|

| **Learning outcome, core skills:**<br>**Learning outcomes:**<br>In this module students learn methods, concepts, theories and applications in mathematical research with particular focus on:<br>• expansion of knowledge in their field of specialisation;<br>• advanced knowledge of methodical and thematic structure of their field of research;<br>alternatively,<br>• supervised designing of a course (lecture course, seminar or exercise class);<br>• supervision of students in seminars, exercise classes etc.<br>**Core skills:**<br>After having successfully completed the module students will be able to<br>• apply a rich repertoire of methods in their field of specialisation;<br>• consider results of their field of research in a larger context;<br>alternatively,<br>• critically reflect the own teaching;<br>• expand their reflection of the scientific background. | **Workload:**<br>Attendance time:<br>28 h<br>Self-study time:<br>62 h |
|---|---|

| **Course: Seminar or lecture course** | 2 WLH |
|---|---|

| **Course assessment: Oral examination (appr. 20 minutes) or written examination (120 minutes) or presentation (appr. 75 minutes), not graded** | 3 C |
|---|---|

| **Requirements:**<br>Proof of complementary knowledge in the field of specialisation. | |
|---|---|

| **Admission requirements:**<br>n/a | **Recommended previous knowledge:**<br>n/a |
|---|---|
| **Language:**<br>English, German | **Person responsible for module:**<br>Dean of Studies |
| **Course frequency:**<br>each semester | **Duration:** |
| **Number of repeat examinations permitted:**<br>twice | **Recommended semester:** |
| **Maximum number of students:**<br>not limited | |

**Additional notes and regulations:**

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Permitted are summer schools, winter schools and comparable block courses. The following will be acknowledged:

- M.Mat.59** 'Oberseminar on';
- M.Mat.57** 'Special course in ...';
- M.Mat.56** 'Topics in ...';
- M.Mat.54** 'Seminar on ...';
- B.Mat.41**, B.Mat.42**.

Alternatively, supervision of students in seminars, exercise classes etc. will be acknowledged.

nicht-amtliche Fassung

| **Georg-August-Universität Göttingen**<br>**Module P.Mat.7301: Accompanying seminar: Introduction to research** | 3 C<br>2 WLH |
|---|---|

| **Learning outcome, core skills:**<br>**Learning outcomes:**<br>In this module students learn methods, concepts, theories and applications in mathematical research with particular focus on:<br>• overview on literature relevant in their field of specialisation.<br>**Core skills:**<br>After having successfully completed the module students will be able to<br>• apply a rich repertoire of methods in their field of specialisation;<br>• independent study on recent research results on the basis of recent research literature. | **Workload:**<br>Attendance time:<br>28 h<br>Self-study time:<br>62 h |
|---|---|

| **Course: Seminar** | 2 WLH |
|---|---|

| **Course assessment: Presentation (appr. 75 minutes), not graded** | 3 C |
|---|---|

| **Requirements:**<br>Proof of overview on literature relevant in a field of research. | |
|---|---|

| **Admission requirements:**<br>n/a | **Recommended previous knowledge:**<br>n/a |
|---|---|
| **Language:**<br>English, German | **Person responsible for module:**<br>Dean of Studies |
| **Course frequency:**<br>each semester | **Duration:** |
| **Number of repeat examinations permitted:**<br>twice | **Recommended semester:** |
| **Maximum number of students:**<br>not limited | |

**Additional notes and regulations:**
Permitted are summer schools, winter schools and comparable block courses. Alternatively, the following will be acknowledged:

- M.Mat.59** 'Oberseminar on';
- M.Mat.54** 'Seminar on ...'.

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| **Georg-August-Universität Göttingen**<br>**Module P.Mat.7302: Accompanying seminar: Scientific analysis of research questions** | 3 C<br>2 WLH |
|---|---|

| **Learning outcome, core skills:**<br>**Learning outcomes:**<br>In this module students learn methods, concepts, theories and applications in mathematical research with particular focus on:<br>• overview on methods relevant to solving problems in mathematical research.<br>**Core skills:**<br>After having successfully completed the module students will be able to<br>• independently formulate mathematical problems;<br>• describe appropriate solution strategies;<br>• communicate solution ideas and obstacles. | **Workload:**<br>Attendance time:<br>28 h<br>Self-study time:<br>62 h |
|---|---|

| **Course: Seminar** | 2 WLH |
|---|---|

| **Course assessment: Presentation (appr. 75 minutes), not graded** | 3 C |
|---|---|

| **Requirements:**<br>Proof of overview on methods relevant in a field of research. | |
|---|---|

| **Admission requirements:**<br>n/a | **Recommended previous knowledge:**<br>n/a |
|---|---|
| **Language:**<br>English, German | **Person responsible for module:**<br>Dean of Studies |
| **Course frequency:**<br>each semester | **Duration:** |
| **Number of repeat examinations permitted:**<br>twice | **Recommended semester:** |
| **Maximum number of students:**<br>not limited | |

**Additional notes and regulations:**
Permitted are summer schools, winter schools and comparable block courses. Alternatively, the following will be acknowledged:

- M.Mat.59** 'Oberseminar on';
- M.Mat.54** 'Seminar on ...'.

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| **Georg-August-Universität Göttingen**<br>**Module P.Mat.7303: Accompanying seminar: Documentation of mathematical issues** | 3 C<br>2 WLH |
|---|---|

| **Learning outcome, core skills:**<br>**Learning outcomes:**<br>In this module students learn methods, concepts, theories and applications in mathematical research with particular focus on:<br>• development of a personalised style of scientific writing following the guidelines of good scientific practice and the recognised standards in mathematics.<br>**Core skills:**<br>After having successfully completed the module students will be able to<br>• independently formulate mathematical problems;<br>• describe appropriate solution strategies;<br>• communicate solution ideas and obstacles;<br>• master the established rules of good scientific practice. | **Workload:**<br>Attendance time:<br>28 h<br>Self-study time:<br>62 h |
|---|---|

| **Course: Seminar** | 2 WLH |
|---|---|

| **Course assessment: Presentation (appr. 75 minutes), not graded** | 3 C |
|---|---|

| **Requirements:**<br>Ability of documentation of mathematical issues. | |
|---|---|

| **Admission requirements:**<br>n/a | **Recommended previous knowledge:**<br>n/a |
|---|---|
| **Language:**<br>English, German | **Person responsible for module:**<br>Dean of Studies |
| **Course frequency:**<br>each semester | **Duration:** |
| **Number of repeat examinations permitted:**<br>twice | **Recommended semester:** |
| **Maximum number of students:**<br>not limited | |

**Additional notes and regulations:**
Permitted are summer schools, winter schools and comparable block courses. Alternatively, a course on good scientific practise (2 WLH / 3C) will be acknowledged as well as:

- M.Mat.59** 'Oberseminar on';
- M.Mat.54** 'Seminar on ...'.

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| **Georg-August-Universität Göttingen**<br>**Module P.Mat.7901: Key competencies in university teaching** | 3 C<br>2 WLH |
|---|---|

| **Learning outcome, core skills:**<br>**Learning outcomes:**<br>Successful completion of this module enables students to acquire skill in university teaching. This includes:<br>• ability to communicate mathematical content to students in the first year of their undergraduate studies;<br>• ability to deal with heterogeneous exercise classes;<br>• use of appropriate teaching methods and visualization techniques;<br>• confident appearance.<br>**Core skills:**<br>After having successfully completed the module students will have acquired:<br>• rhetoric and presentation skills;<br>• team competence including constructive way of dealing with conflicts and capability to motivate;<br>• time management skills;<br>• intercultural communication skills, where applicable. | **Workload:**<br>Attendance time:<br>28 h<br>Self-study time:<br>62 h |
|---|---|

| **Course: Exercise class** | 2 WLH |
|---|---|

| **Course assessment: Giving a lesson in an exercise classe (appr. 90 minutes), not graded** | 3 C |
|---|---|

| **Requirements:**<br>Ability to apply basic key competencies in university teaching. | |
|---|---|

| **Admission requirements:**<br>n/a | **Recommended previous knowledge:**<br>n/a |
|---|---|
| **Language:**<br>English, German | **Person responsible for module:**<br>Dean of Studies |
| **Course frequency:**<br>each semester | **Duration:** |
| **Number of repeat examinations permitted:**<br>twice | **Recommended semester:** |
| **Maximum number of students:**<br>not limited | |

**Additional notes and regulations:**
This module can be replaced by any other key competency module offered by the teaching unit mathematics or by any cross-faculty key competency module. In particular, B.Mat.0931 "Tutorentraining" as well as supervision of students in exercise classes (2WLH) will be acknowledged.

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