### Module title

**Geometric Analysis and Partial Differential Equations**

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<th>Abbreviation</th>
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<tr>
<td>10-M-GAP-092-m01</td>
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### Module coordinator

**Dean of Studies Mathematik (Mathematics)**

### Module offered by

**Institute of Mathematics**

### ECTS

| 13 |

### Method of grading

| numerical grade |

### Only after succ. compl. of module(s)

| -- |

### Duration

| 2 semester |

### Module level

| undergraduate |

### Other prerequisites

*By way of exception, additional prerequisites are listed in the section on assessments.*

### Contents

Basics in analysis on manifolds, e.g. submanifolds and calculus of differential forms, Stoke's theorem and its applications in vector calculus and topology, examples of first order partial differential equations, existence and uniqueness theorems, basic equations in mathematical physics, boundary value theorems, maximum principle and Dirichlet problem.

### Intended learning outcomes

The student knows and masters the basic notions and essential methods of vector analysis on manifolds and partial differential equations. He/She is able to perform mathematical arguments in this field independently, and can present them adequately in written and oral form. He/She is able to apply the central proof methods and concepts of geometric analysis and partial differential equations and knows about their analytic background.

### Courses

This module comprises 3 module components. Information on courses will be listed separately for each module component.

- **10-M-GAP-1-092:** V + Ü (no information on SWS (weekly contact hours) and course language available)
- **10-M-GAP-2-092:** V + Ü (no information on SWS (weekly contact hours) and course language available)
- **10-M-GAP-P-092:** M (no information on SWS (weekly contact hours) and course language available)

### Method of assessment

**Assessment in module component 10-M-GAP-1-092: Geometric Analysis**

- 7 ECTS, Method of grading: (not) successfully completed
- a) written examination (approx. 90 minutes; usually chosen) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- Other prerequisites: Modules 10-M-ANA and 10-M-LNA are recommended.

**Assessment in module component 10-M-GAP-2-092: Partial Differential Equations**

- 4 ECTS, Method of grading: (not) successfully completed
- a) written examination (approx. 90 minutes; usually chosen) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- Other prerequisites: Modules 10-M-ANA and 10-M-LNA are recommended.

**Assessment in module component 10-M-GAP-P-092: Examination in Geometric Analysis and Partial Differential Equations**

- 2 ECTS, Method of grading: numerical grade
- oral examination of one candidate each (approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- Only after successful completion of module components: 10-M-GAP-1 or 10-M-GAP-2
- Other prerequisites: Modules 10-M-ANA and 10-M-LNA are recommended.
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<tr>
<td>Additional information</td>
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<tr>
<td>Referred to in LPO I</td>
<td>(examination regulations for teaching-degree programmes)</td>
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<tbody>
<tr>
<td>Bachelor' degree (1 major) Mathematical Physics (2009)</td>
</tr>
<tr>
<td>Bachelor' degree (1 major) Computational Mathematics (2009)</td>
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