Georg-August-Universität Göttingen **Module M.Mat.4715: Special course in mathematical methods in physics**	3 C 2 WLH

Learning outcome, core skills: **Learning outcome:** In the modules of the cycle "Mathematical methods of physics" students get to know different mathematical methods and techniques that play a role in modern physics. They are introduced to current research questions and enabled to carry out independent contributions to research, e. g. within the scope of a Master's thesis. The topics of the cycle can be divided into four blocks, a cycle normally contains parts of different blocks, that topically supplement each other, but can also be read within one block. The introducing parts of the cycle form the basis for the advanced specialisation area. The topic blocks are • harmonic analysis, algebraic structures and representation theory, (group) effects; • operator algebra, C* algebra and von-Neumann algebra; • operator theory, perturbation and scattering theory, special PDE, microlocal analysis, distributions; • (semi) Riemannian geometry, symplectic and Poisson geometry, quantization. One of the aims is that a connection to physical problems is visible, at least in the motivation of the covered topics. Preferably, in the advanced part of the cycle, the students should know and be able to carry out practical applications themselves. **Core skills:** After having successfully completed the module, students will be able to • conduct scholarly debates about problems of the area "Mathematical methods of physics"; • become acquainted with special problems in the area "Mathematical methods of physics" to carry out scientific work for it.	**Workload:** Attendance time: 28 h Self-study time: 62 h

Course: Lecture course (Lecture)	2 WLH

Examination: Oral examination (approx. 20 minutes)	3 C

Examination requirements: Proof of the acquisition of further special skills and the mastery of advanced competencies in the area "Mathematical methods in physics"	

Admission requirements: none	**Recommended previous knowledge:** B.Mat.3315
Language: English	**Person responsible for module:** Programme coordinator
Course frequency: not specified	**Duration:** 1 semester[s]

Number of repeat examinations permitted: twice	**Recommended semester:** Master: 1 - 3
Maximum number of students: not limited	

Additional notes and regulations:
Instructor: Lecturers at the Mathematical Institute