Advanced Differential Geometry 2 - Spin Geometry

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Spin geometry is a special topic within Riemannian geometry at whose core lies the Dirac operator. The Dirac operator was found by P. A. M. Dirac while he was in search of a physical theory of the electron which encompasses both special relativity and quantum mechanics. It took mathematicians several decades, namely until after the establishment of the framework of principal fibre bundles, to realize how the Dirac operator can be defined on a Riemannian manifold. The driving force behind this quest was M. Atiyah's and I. Singer's desire to answer a question of Gelfand: can the analytic index of a differential operator be expressed in topological quantities of the underlying compact manifold. Their answer resulted in the Atiyah-Singer-Index Theorem, one of the greatest achievements of 20th century mathematics.

The course aims at introducing the students to the fundamentals of Riemannian spin geometry so that they can navigate the literature and easily connect to current research. Prerequisite is an understanding of the basics of Riemannian geometry as taught in Differential Geometry I.

Please note that if you are part of the Mathematical Physics Master's program you also have to attend the lecture ***Morse theory, closed geodesics and geometry*** *by Prof. Dr. Hans-Bert Rademacher to successfully complete the module Advanced Differential Geometry 2.*

The course homepage can be found at

https://www.math.uni-leipzig.de/~boldt/adv-diffgeo2-2020.html.

Please register for the course with a short e-mail to boldt@math.uni-leipzig.de.