MAT 682: INDEX THEOREMS FOR ELLIPTIC OPERATORS

Instructor: Blaine Lawson

Tuesday and Thursday, 10:00 - 11:20 is P-123

Office Hours: Tuesday and Thursday, 11:30 - 1:00 in room 5-109
I am also willing to meet at other times. See me at class or e-mail me at blaine@math.sunysb.edu to make arrangements.

References for the course: The best reference is

*Spin Geometry* by Professor Michelsohn and myself. QC793.3.S6 L39 1989

Further books:


The following is an outline of the syllabus for the course. The plan is to do these subjects from the beginning — that is, you will not be required to already know them.

On the other hand, the main part of the course will be topics 6, 7, 8 and 9.
SYLLABUS

1. Riemann-Roch Theorem. (3 Versions)

2. Vector Bundles, Characteristic Classes, etc.
   - (1) Vector Bundles and Classifying Spaces.
   - (2) The Splitting Principle.
   - (3) Chern Classes.
   - (4) Pontryagin Classes.
   - (5) K-Theory
   - (6) The Chern Character.
   - (7) Multiplicative Sequences.
   - (8) Examples.


4. The Functor $K_{cpt}$ and the class of $\sigma(D)$.

5. Clifford Algebras, Clifford Bundles, $Cl(X)$ and Dirac-type Operators.
   (with some basic examples).

6. Pseudodifferential Operators.
   - (1) Definitions and elementary properties.
   - (2) Elliptic PSD’s and parametrices.
   - (3) Fundamental results for elliptic operators.

7. The Topological Invariance of the Index.

8. The Thom Isomorphism and the Chern Character Defect.


11. Applications.
Disability Support Services: If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, 128 ECC Building (631) 632-6748. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential. Arrangements should be made early in the semester (before the first exam) so that your needs can be accommodated. All information and documentation of disability is confidential. Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information go to the following website: http://www.ehs.sunysb.edu and search Fire Safety and Evacuation and Disabilities.

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