

MAT 1063: Introduction to Microlocal Analysis

Syllabus Fall 2009

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Lectures: TuTh 2-3:30 BA6180 Office hours: by appointment

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Textbook:

Introduction to microlocal analysis, by Richard B. Melrose (available online: <http://www-math.mit.edu/~rbm/iml90.pdf>)

Course outline:

- Tempered distributions and the Fourier transform
- Pseudodifferential operators on the Euclidean space and their basic properties
- Microlocalization and the wave front set
- Pseudodifferential operators on manifolds
- Application to the wave equation (propagation of singularities theorem)
- Complex power and the residue trace

Prerequisites:

Real Analysis (MAT1000HF and MAT1001HS)

Grade:

The course grade will be based on class participation and few assignments.

Other references

- A. Grigis and J. Sjöstrand, *Microlocal Analysis for Differential Operators*, Cambridge University Press, 1994.
- L. Hörmander, *The Analysis of Linear Partial Differential Operators I*, Springer-Verlag, second edition, 1990.
- L. Hörmander, *The Analysis of Linear Partial Differential Operators III*, Springer-Verlag, 1994.
- M.A. Shubin, *Pseudodifferential Operators and Spectral Theory*, Springer, Second Edition, 2001.
- C. Sulem and P.-L. Sulem, *The Nonlinear Schrödinger Equation*, Springer, 1999.
- M. Taylor, *Partial Differential Equations II: Qualitative Studies of Linear Equations*, Springer, 1997.
- J. Wunsch, *Microlocal Analysis and evolution equations*, lecture notes, Clay summer school 2008, available online: <http://arxiv.org/abs/0812.3181>.