

## Course Information

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**References.** There is no required textbook for the course, but the following may be useful references.

- M. Kashiwara and P. Schapira, *Sheaves on manifolds*, Grundlehren der Mathematischen Wissenschaften, no. 292, Springer-Verlag, Berlin, 1990.
- A. Dimca, *Sheaves in topology*, Universitext, Springer-Verlag, Berlin, 2004.
- A. Beilinson, J. Bernstein, and P. Deligne, *Faisceaux pervers*, Astérisque **100**, Soc. Math. France, 1982.

There are also notes available from a Spring 2007 course on sheaves available on my webpage.

**Course outline.** A rough schedule of topics for the semester is as follows.

Basic properties; sheaf functors; local systems	2–3 weeks
Derived categories of sheaves; derived sheaf functors; Poincaré–Verdier duality	3–4 weeks
Perverse sheaves and intersection cohomology complexes	2–3 weeks
Examples; applications; further topics	remaining time

Some possibilities for the “further topics” include:

- applications in representation theory, such as Kazhdan–Lusztig theory, Springer theory, or canonical bases for quantum groups;
- more operations on perverse sheaves, such as Fourier–Sato transform, nearby and vanishing cycles, or hyperbolic localization;
- coherent sheaves
- sheaves in Grothendieck topologies;  $\ell$ -adic sheaves
- the formalism of weights and the Decomposition Theorem

**Homework & Grading.** Homework exercises will be due approximately once every two weeks. All the homework exercises will be posted on my webpage. I expect substantial efforts on each problem set, but of course, I do not expect perfect solutions to every problem, nor is it likely that every problem will be graded. The grade for the semester will be based on the number of problem sets submitted with substantial work:

- A Substantial work on all or all but one problem sets
- B Substantial work on more than half the problem sets, but missing at least two
- C Substantial work on at least one problem set, but fewer than half
- D Less than one problem set submitted
- F No work submitted

Under normal circumstances, I expect everyone to earn an ‘A’. If you feel that you are getting behind, please come see me as soon as possible.

**Exams.** There will be no timed exams. In lieu of a final exam, the last homework assignment will be due at the scheduled time for the final exam: Friday, December 7, 12:30pm.