

SYLLABUS FOR FALL 2016
MATH 8300 “ALGEBRAIC GEOMETRY”

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Algebraic geometry, put concisely, is the study of solutions of systems of polynomial equations in several variables. It studies them from different points of view:

- straight-up algebraically,
- topologically, considering the solution set as a topological space,
- using the tools of differential geometry, such as differential forms, integrals,
- etc, etc.

All of these points of view are valid and have their own place. In the beginning, the purely algebraic approach seems to be the easiest.

In turn, algebraic geometry is heavily used in many other fields of mathematics: number theory, algebra, representation theory, differential geometry, etc.

There are many textbooks for algebraic geometry. Some enduring classics are Shafarevich [Sha77], Hartshorne [Har77], Griffiths and Harris [GH78]. There are also many-many more recent books. None of them are perfect, so the course will be taught using a combination of these and the notes.

This is a beginning course and there are not many prerequisites beyond some basic algebra and geometry. It is certainly helpful to have studied some commutative algebra, but it also can be done after this course, after learning some geometric intuition for the algebraic concepts. It is also helpful to have studied some differential geometry or topology before but it is not mandatory.

REFERENCES

- [GH78] P. Griffiths and J. Harris, *Principles of Algebraic Geometry*, Wiley-Interscience, 1978.
[Har77] Robin Hartshorne, *Algebraic geometry*, Springer-Verlag, New York, 1977, Graduate Texts in Mathematics, No. 52.
[Sha77] I.R. Shafarevich, *Basic Algebraic Geometry*, vol. 213, 1977.