Quiver Representations - Math Scholars Course 3094 - (Spring 2017)

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Schedule:
MWF 8:55-9:55 in MONT 101
Office Hours:
MW 3:00-4:00, or by appointment

Description:
A quiver is an oriented graph. A quiver representation is a collection of vector spaces and linear maps; one vector space V_i for each vertex i of the quiver and one linear map f_{ij} from V_i to V_j for each arrow $i \to j$ of the quiver.

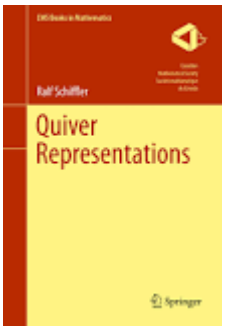
The complexity of different representations depends on the quiver. For some (few) quivers we can explicitly write down a finite number of representations such that any representation of the quiver can be constructed from our finite list by taking direct sums and using isomorphisms. In these cases our finite list can be constructed combinatorially in the so-called Auslander-Reiten quiver.

We will study the properties of quiver representations, and see how to compute the Auslander-Reiten quiver in specific examples, using algebraic methods as well as combinatorial methods for example triangulations of polygons.

We will cover the first three sections of the textbook. Representations, morphisms, direct sums, indecomposable representations, kernels, cokernels, exact sequences, simple representations, projective representations, radicals of projectives, Auslander-Reiten translation, extensions, examples of Auslander-Reiten quivers. If time permits we may cover some of chapter 8.

Prerequisites: From Abstract Linear Algebra we need finite dimensional vector spaces, bases, matrix description of linear maps, direct sums. Some algebraic experience would be good, the concept of a homomorphism, isomorphism, kernels, quotients. However no knowledge of group or ring theory is required. If needed, the concepts from linear algebra will be reviewed in the first week of the course.

Textbook:
Ralf Schiffler
Quiver Representations
CMS Books in Mathematics
Springer Verlag, 2014



Homework:
Homework will be assigned in class and collected for grading every other week.

Course Grade:
The course grade is based on your homework assignments.