

MAT2000: Hochschild (co)homology

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Description: Given an associative algebra A over a field k (e.g. polynomial algebra $k[x]$ or matrix algebra $M_n(k)$), the Hochschild (co)homology assigns a sequence of k -vector spaces $\mathrm{HH}^n(A)$. These vector spaces encode structural information of the algebra A .

Goal: In a first stage the student should learn generalities about chain complexes and associative algebras. Then, the Hochschild complex of a k -algebra A is studied. This leads to the definition of the (co)homology vector spaces. The objective next will be to prove how the center and trace of the algebra A are realized in terms of Hochschild (co)homology. For motivated students, one could further look at the relation to derivations and Morita invariance.

References

- [links] <https://math.mit.edu/~rbm/iml/Chapter11.pdf>
 https://en.wikipedia.org/wiki/Hochschild_homology
 <https://www.homepages.ucl.ac.uk/~ucahbdo/4thYearProject.pdf>
- [Weibel94] C. Weibel, *An introduction to Homological Algebra*. Cambridge Studies in Advanced Mathematics 38, (1994).