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פרופ' אמנון יקותיאל  
המחלקה למתמטיקה  
אוניברסיטת בן גוריון  
באר שבע 84105

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22 February 2020

Course Announcement:  
**Homological Algebra**  
Spring Semester 2019-20

*Catalog Number:* 201.2.2091

*Time:* Wednesday 12:00 – 14:00

*Place:* Building 58 room 201

*First meeting:* 11 March 2020

*Teaching Language:* English

*Web Page:* [https://www.math.bgu.ac.il/~amyekut/teaching/2019-20/homol-alg/course\\_page.html](https://www.math.bgu.ac.il/~amyekut/teaching/2019-20/homol-alg/course_page.html)

*Description:* This is a graduate level course. Undergraduate students can register with my permission.

The prerequisite course is "Commutative Algebra" that I gave in the fall semester (or an equivalent course). We will need the following topics from that course: categories and functors; additive and exact functors; free modules; products and coproducts; tensor products of modules and rings.

The pace of the course, and the amount of material covered, will be determined by the background and capability of the audience. There will be many examples and exercises. I will upload typed notes after every lecture.

*Course Grade:* pass/fail grade. Passing the course requires attending all lectures and submitting most of the homework.

*Homework:* To be assigned every week. Checking will be sporadic.

See the first day handout for more administrative information.

*Course Topics:*

1. Adjoint functors.
2. Morita Theory.
3. Projective and Injective modules.
4. Complexes of modules.
5. Homotopies and homotopy equivalences.
6. The long exact cohomology sequence.
7. Projective, flat and injective resolutions.
8. Left and right derived functors.
9. Applications of derived functors to commutative algebra.
10. Further applications of derived functors and cohomology.

*Bibliography:*

1. P.J. Hilton and U. Stammbach, "A Course in Homological Algebra", Springer, 1971.
2. S. MacLane, "Homology", Springer, 1994.
3. J. Rotman, "An Introduction to Homological Algebra", Academic Press, 1979.
4. L.R. Rowen, "Ring Theory" (Student Edition), Academic Press, 1991.
5. C. Weibel, "An introduction to homological algebra", Cambridge Univ. Press, 1994.
6. A. Yekutieli, "Derived Categories", Cambridge Univ. Press, 2019.
7. Course notes, to be uploaded every week to the [course web page](#).