אוניברסיטת בן-גוריון בנגב

המחלקה למתמטיקה

סמסטר 2017–18 ב

שם הקורס אלגברה הומולוגית

מספר קורס 201.2.2091

עמוד הקורס ברשת https://www.math.bgu.ac.il/~amyekut/teaching/2017-18/hom-alg/course_page.html

מרצה אחראי פרופ׳ אמנון יקותיאלי, <amyekut@bgu.ac.il>, חדר 202

שעות קבלה https://www.math.bgu.ac.il/he/teaching/hours

תקציר

דרישות והרכב ציון הקורס[1]

נושאי לימוד

1. Recalling prior material. Rings (including noncommutative), ideals, modules and bimodules, exact sequences, infinite direct sums and products, tensor products of modules and rings.
2. Categories and functors. Morphisms of functors, equivalences. Linear categories and linear functors. Exactness of functors.
3. Special modules. Projective, injective and flat modules.
4. Morita Theory. Equivalences of module categories realized as tensor products.
5. Complexes of modules. Operations on complexes, homotopies, the long exact cohomology sequence.
6. Resolutions. Projective, injective and flat resolutions – existence and uniqueness.
7. Left and right derived functors. The general theory. Tor and Ext functors.
8. Applications to commutative algebra. Some local and global theorems, involving Tor and Ext functors. Derived completion and torsion functors.

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[1] דרישות הקורס יכולות להשתנות במהלך השבועיים הראשונים של הסמסטר, ויש לשים לב להודעות באתר הקורס

9. A survey of the role of homological algebra in geometry. Sheaf cohomology.

10. A survey of classfiication theorems: Galois cohomology, Nonabelian cohomology. vector bundles.

Bibliography

1. Hartshorne, R. "Algebraic Geometry", New-York, Springer-Verlag, 1977.

2. Hilton P.J. and Stammbach, U. "A Course in Homological Algebra", Springer, 1971.

3. Maclane, S. "Homology", Springer, 1994.

4. Rotman, J. "An Introduction to Homological Algebra", Academic Press, 1979.

5. Rowen, L.R. "Ring Theory" (Student Edition), Academic Press, 1991.

6. Weibel, C. "An introduction to homological algebra", Univ. Cambridge Press, 1994.

7. Schapira, P. and Kashiwara M. Manfiolds, on Sheaves, Springer, 1990.

8. The Stacks Project ,[2]an online reference, Jong de J.A. (Editor). (10) Course, notes to be uploaded every week to the course web page. Free prepublication version.[3] Derived Categories", Univ. Cambridge Press, 2019.

[2] http://stacks.math.columbia.edu
[3] https://arxiv.org/abs/1610.09640v4