

**PRACTICAL INFORMATION**

Class hours: MWF 10:00–10:50 am  
Class room: MA 017  
Instructor: Lars Winther Christensen  
Office: MA 251  
Office hours: T 11:30–1:00 pm, and R 10:30–12:00 noon, or by appointment  
Phone: (806) 742-2580 x 366  
E-mail: lars.w.christensen@ttu.edu  
Course homepage: [www.math.ttu.edu/~lchriste/teaching5399122.html](http://www.math.ttu.edu/~lchriste/teaching5399122.html)

**COURSE DESCRIPTION**

Homological algebra is framework that allows us to bring techniques from linear algebra to bear on problems from topology, algebra, and geometry. This course provides an introduction to the subject, and it also covers applications in commutative algebra.

**Text:** Lecture notes “Derived Category Methods in Commutative Algebra”.

**Prerequisites:** Math 5399 Homological Algebra (Fall 2011).

**Expected learning outcomes:** After completion of the course, the students will have an in-depth understanding of the homotopy category and the derived category of a ring and have seen several applications of homological algebra to problems in ring theory.

The topics covered include

- The homotopy category over a ring
- The derived category over a ring
- (Abstract) derived functors
- Ext and Tor
- Homological dimensions
- Koszul homology
- Homological invariants in local algebra
- Homological characterization of regular rings and other applications in commutative algebra.

**LEARNING ASSESSMENT**

Graded assessment is done through homework and exams. Other assessment techniques will also be used; these include direct questioning, problems to be solved in class, and discussions during office hours. Additionally, problems will be assigned for student self-assessment.

**COURSE ORGANIZATION**

The plan is to cover chapters 6–10 and parts of chapters 14, 15, 17, and 19 in the lecture notes. Exact reading assignments are posted on the course homepage, which is updated after every class.

**Exams:** Take-home exams are due on 5 March and 23 April There is no final exam.

### Other important dates:

Last day to drop a course without penalty	3 Feb.
Spring Break	10–18 March
Last day to drop a course	28 March
No classes	9 April
Last day to withdraw	3 May

### ASSIGNMENTS, GRADES, AND GRADING

Two take-home exams are given during the semester. Homework will be assigned 12 times during the semester and is due on Fridays.

**Grading policy:** On exams and written homework, partial credit for correct steps will be awarded even if the final answer is wrong. Full credit will be given only if the final answer and all intermediate steps are correct. A correct final answer does not *per se* guarantee any credit.

**Final grade:** Homework (10 assignments) and exams (2) are counted towards the final grade with weights as follows: Homework 50% (5% ea.) and exams 50% (25% ea.).

### GENERAL POLICIES

**Academic integrity:** It is the aim of the faculty of TTU to foster a spirit of complete honesty and a high standard of integrity. Any attempt of students to present as their own any work that they have not honestly performed is regarded by faculty and administration as a serious offense and renders the offenders liable to serious consequences, possibly suspension. Please see more information on-line at [www.depts.ttu.edu/studentaffairs/CampusCrime/documents/integritymatters.pdf](http://www.depts.ttu.edu/studentaffairs/CampusCrime/documents/integritymatters.pdf).

**Civility in the classroom:** You are expected to be courteous to me and your fellow students. This means that your cell-phone should be turned off during the class; you shall not chat with your friends during class, eat meals or snacks, or cause a distraction in any other way.

**Officially approved trips:** Students are allowed to miss class for trips officially sanctioned by TTU. The student must notify the instructor of upcoming trips and present written authorization.

**Religious holy days:** You are allowed to take the time to travel and observe a religious holy day. Prior notice should be given at least one week before the absence.

**Students with disabilities:** Any student who, because of a disability, may require special arrangements in order to meet course requirements should contact the instructor as soon as possible to make any necessary arrangements. Students should present appropriate verification from Student Disability Services during the instructor's hours. Please note instructors are not allowed to provide classroom accommodations to a student until appropriate verification from Student Disability Services has been provided. For additional information, you may contact the Student Disability Services office at 335 West Hall or 806-742-2405.