# Math 8211 Homological Algebra Fall Semester 2012

**Instructor**

Peter Webb, 350 Vincent Hall, 625 3491, webb@math.umn.edu, http://www.math.umn.edu/~webb
Office Hours: MWF 11:15 - 12:05 or by appointment.

**Book**

We will follow much of the material in the book
J.J. Rotman, An Introduction to Homological Algebra, 2nd edition, Springer 2009, ISBN 978-0-387-24527-0
Through the library there is a link to an online version of this text, and you should check out the price you can get it for online if you want a hard copy.

**Course Content and Goals**

We will start by studying selected sections from Rotman's book, going up to the material in Chapter 7. Specifically, we will study the following sections: 1.2, all of Chapter 2, 3.1-3.3, omit Chapter 4, 5.1-5.3, 5.5, 6.1, 6.2, 7.1, 7.2, 7.4 We will usually not do in class everything Rotman describes in these sections, and sometimes we may do things not in the text. After that we will do some specific topics whose choice will be influenced by the wishes of the audience. Some possible later topics are: group cohomology, spectral sequences, the derived category. The latter topic is not in Rotman's book, so I will supplement it with some suitable material.

In the second semester we will study commutative algebra, following the book by Matsumura.

**Course Assessment**

I will assign a set of homework problems roughly every 2 weeks, giving a total of six homework assignments altogether. Your grade will be assessed on this in the following way: if you make a genuine attempt at 50% or more of the questions you will get an A for the course. You do not have to obtain correct solutions to these questions, only make genuine attempts (in my opinion). I believe that it is extremely difficult to obtain a sound and permanently lasting command of the material presented without doing some work which actively involves the student. It should be possible for everyone who wishes to obtain an A on this course.

**Expectations of written work**

Most of the time in the conventional homework problems, to satisfy my criterion of making a genuine attempt you will need to write down explanations for the calculations and arguments you make. Where explanations need to be given, these should be written out in sentences i.e. with verbs, capital letters at the beginning, periods at the end, etc. and not in an abbreviated form.
I encourage you to form study groups. However everything to be handed in must be written up in your own words. If two students hand in identical assignments, they will both receive no credit.

**Prerequisites**

The content of the Math 8201/2 algebra sequence is sufficient as a prerequisite. More specifically, we will need to know about split short exact sequences, projective modules and

tensor products (if these were taught). Noetherian properties and other things like normal forms of matrices may be useful.

**Incompletes**
These will only be given in exceptional circumstances. A student must have satisfactorily completed all but a small portion of the work in the course, have a compelling reason for the incomplete, and must make prior arrangements with me for how the incomplete will be removed, well before the end of the quarter.

Date of this version of the schedule: 8/31/2012