

# MTG5932—Homotopy Theory

## Fall 2017

INSTRUCTOR: Dr. Ettore Aldrovandi.

OFFICE: 215 LOV.

OFFICE HOURS: Announced on the instructor's webpage

**Schedule** Class will meet on MWF, 2:30–3:20 pm, in LOV 104.

**Canvas** To access this course in Canvas, please log in with your FSUID to <https://fsu.instructure.com> or select the Canvas icon when logged into <https://my.fsu.edu>.

**Prerequisites** Top III (i.e. MTG 5346, Algebraic Topology), and/or GRV III (i.e. MAS 5311, Abstract Algebra I), or permission by the instructor.

**Texts** The primary source will be the following articles (available online):

1. W. G. Dwyer, J. Spaliński, *Homotopy theories and model categories*. Handbook of algebraic topology, 73–126, North-Holland, Amsterdam, 1995. (Available from the first author's web page).
2. P. Goerss, K. Schemmerhorn, *Model categories and simplicial methods*. Contemp. Math. **436**, AMS (2007). [arXiv:math/0609537](https://arxiv.org/abs/math/0609537)

In addition, the following books are standard references. The FSU Library holds copies of all of them:

1. D. Quillen, *Homotopical Algebra*. Lecture Notes in Mathematics, No. **43** Springer-Verlag, Berlin-New York 1967.
2. P. Goerss, J. F. Jardine, *Simplicial homotopy theory*. Birkhäuser Verlag, 1999 (or 2009 paperback ed.).
3. P. S. Hirschhorn, *Model categories and their localizations*. Mathematical Surveys and Monographs, 99. American Mathematical Society, Providence, RI, 2003.
4. M. Hovey, *Model categories*. Mathematical Surveys and Monographs, 63. American Mathematical Society, Providence, RI, 1999.

### Course objectives

1. Introduce homotopy theory from a modern point of view;
2. Show how one can “do homotopy” on categories other than that of topological spaces.

### Course content

1. Review of categorical preliminaries;
2. Definition of model structures;
3. Quillen functors and morphisms of model structures;
4. Equivalences between the homotopy theories of simplicial sets and that of topological spaces;
5. Homotopy theories for rings and algebras.

**Exams** There will be no exams.

**Homework** There will be no homework problems to be collected.

**Class notes** Students will write up class notes in L<sup>A</sup>T<sub>E</sub>X. Duties will be rotated in a cyclic fashion.

**Grading** Your grade will be based on attendance and your timely writeup of your assigned notes.

Attendance determines the grade as follows: assuming the note-writing requirements are met, the grade is determined according to the following table:

Absences	0-5	6-10	11-15	16-20	> 20
Grade	A	B	C	D	F

Excuses will be considered if the student presents sufficient and verifiable documentation that absences are beyond the student's control (for example, health, or travel required by graduate work). In that case, a make-up project to be determined can be used.

**University Attendance Policy** Excused absences include documented illness, deaths in the family and other documented crises, call to active military duty or jury duty, religious holy days, and official University activities. These absences will be accommodated in a way that does not arbitrarily penalize students who have a valid excuse. Consideration will also be given to students whose dependent children experience serious illness.

**Academic Honor Policy** The Florida State University Academic Honor Policy outlines the University's expectations for the integrity of students' academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process. Students are responsible for reading the Academic Honor Policy and for living up to their pledge to "...be honest and truthful and... [to] strive for personal and institutional integrity at Florida State University." (Florida State University Academic Honor Policy, found at <http://fda.fsu.edu/Academics/Academic-Honor-Policy>.)

**Americans With Disabilities Act** Students with disabilities needing academic accommodation should: (1) register with and provide documentation to the Student Disability Resource Center; and (2) bring a letter to the instructor indicating the need for accommodation and what type. This should be done during the first week of class.

This syllabus and other class materials are available in alternative format upon request.

For more information about services available to FSU students with disabilities, contact the:

Student Disability Resource Center  
874 Traditions Way  
108 Student Services Building  
Florida State University  
Tallahassee, FL 32306-4167  
(850) 644-9566 (voice)  
(850) 644-8504 (TDD)  
[sdrc@admin.fsu.edu](mailto:sdrc@admin.fsu.edu)  
<http://www.disabilitycenter.fsu.edu/>