

Math 595 (Reading & Research I)

by Jawad Abuhlail

Title: Topological Lattices

Semester: 172

Credit Hours: 3

Rationale/Objectives: The main objective of the course is to provide the student with basic knowledge about Topological Lattices.

Learning Outcomes: By the end of this course, the student is supposed to control the basic definitions and the foundations of:

- a) Lattice Theory
- b) Topological Lattices
- c) Zariski-like Topologies for Lattices & Modules

Textbook: G. Grätzer, *Lattice Theory: Foundations*, 1st ed., Birkhäuser Verlag (2011).

<https://link.springer.com/extoljp.kfupm.edu.sa/content/pdf/10.1007%2F978-3-0348-0018-1.pdf>

Papers:

[P1] J. Abuhlail and Ch. Lomp, *On Topological Lattices and their Applications to Module Theory*, J. Algebra Appl. 15 (3), Article ID 1650046, 21 p. (2016).

[P2] J. Abuhlail and H. Hroub, *Zariski-like Topologies for Lattices with Applications to Modules over Commutative Rings*, submitted. (<https://arxiv.org/abs/1711.03912>)

Remark: Part of MATH 651 (Universal Algebra) is about lattices; however, the overlap does not exceed 10%.

Syllabus

Chapter	Section	Material	Week(s)
I: First Concepts	1	Two Definitions of Lattices	1
	2	How to Describe Lattices	2
	3	Some Basic Concepts	3
	6	Special Elements	4
II: Distributive Lattices	3	Congruence Relations	5
	4	Boolean Algebras R-generated by Distributive Lattices	6
III: Congruences	1	Congruence Spreading	7
	2	Distributive, Standard and Neutral Elements	8
V: Modular and Semimodular Lattices	1	Modular Lattices	9
[P1] Topological Lattices			10-12
[P2] Zariski-like Topologies for Lattices			13-15

Grading:

Final Exam	40%
Assignments	20%
Presentations	40%