

## **Math 695 (Reading and Research I)**

**by Jawad Abuhlail**

**Title:** The Zariski Topology

**Semester:** 121

**Rationale/Objectives:** The main objective of the course is to provide the student with some background in Algebraic Geometry and some basic knowledge on Zariski-like topologies for modules over commutative rings which will be the main topic in his Ph.D. thesis.

**Remark:** The first part of the course shall be a continuation of the currently offered course Math654 “Advanced Topics in Algebra”.

### **Text Book:**

Ulrich Görtz and T. Wedhorn, *Algebraic geometry I. Schemes with examples and exercises*. Advanced Lectures in Mathematics. Vieweg + Teubner, Wiesbaden, 2010 (ISBN-10: 3834806765; ISBN-13: 978-3834806765).

### **Papers:**

[JP1] M. Hochster, *Prime ideal structure in commutative rings*, Trans. Amer. Math. Soc., 142, 43–60 (1969).

[JP2] R. L. McCasland and P.F. Smith, *Zariski spaces of modules over arbitrary rings*, *Comm. in Algebra* 34, 3961 -- 3973 (2006).

### **Further Reading:**

- J. Abuhlail, *A Zariski Topology for Modules*, *Communications in Algebra* 39 (12) (2011), 1-19.

- W. Fulton, *Algebraic Curves. An Introduction to Algebraic Geometry*, Addison-Wisley Publishing Company, Advanced Books Program, Redwood City, CA (1989).  
A revised version is available at:  
<http://www.math.lsa.umich.edu/~wfulton/CurveBook.pdf>
- R. Hartshorne, *Algebraic Geometry*, Graduate Texts in Mathematics 52, Springer (2010).

**Grading Policy:**

<b>Presentations</b>	<b>Final</b>
60%	40%

**Syllabus**

<b>Material</b>	<b>Week(s)</b>
<b>• Part I: Textbook</b>	
Ch. 1: Prevarieties	1
Ch. 2: Spectrum of a ring	2
Ch. 3: Schemes	4
Ch. 4: Fiber Products	2
<b>• Part II: Research Papers</b>	
[JP1]	3
[JP2]	3