# FLORIDA ATLANTIC UNIVERSITY™

## Graduate Programs—NEW COURSE PROPOSAL[1]

UGPC APPROVAL _____
UFS APPROVAL _____
SCNS SUBMITTAL _____
CONFIRMED _____
BANNER POSTED _____
CATALOG _____

DEPARTMENT MATHEMATICAL SCIENCES

COLLEGE CHARLES E. SCHMIDT COLLEGE OF SCIENCE

RECOMMENDED COURSE IDENTIFICATION (*TO OBTAIN A COURSE NUMBER, CONTACT NMALDONADO@FAU.EDU*)

PREFIX ___MAS_____ COURSE NUMBER __6310_____ LAB CODE (L or C) _____

COMPLETE COURSE TITLE: ALGEBRAIC CURVES

**EFFECTIVE DATE**
**(first term course will be offered)**

__SPRING 2018_____

CREDITS[2]
3

TEXTBOOK INFORMATION
*Plane Algebraic Curves,* by G. Orzech and M. Orzech, Marcel Dekker (1981).

GRADING (*SELECT ONLY ONE GRADING OPTION*): REGULAR __X___ SATISFACTORY/UNSATISFACTORY _____

COURSE DESCRIPTION, NO MORE THAN THREE LINES:
AN INTRODUCTION TO ALGEBRAIC CURVES. TOPICS INCLUDE AFFINE ALGEBRAIC SETS AND VARIETIES, LOCAL PROPERTIES OF PLANE CURVES, PROJECTIVE VARIETIES, MORPHISMS, AND RATIONAL MAPS.

| PREREQUISITES* | COREQUISITES* | REGISTRATION CONTROLS (MAJOR, COLLEGE, LEVEL)* |
|---|---|---|
| MAS 5311 AND MAS 5312 WITH A GRADE OF "C" OR HIGHER | | MUST BE ENROLLED IN THE GRADUATE LEVEL |

* *PREREQUISITES, COREQUISITES AND REGISTRATION CONTROLS WILL BE ENFORCED FOR ALL COURSE SECTIONS.*

MINIMUM QUALIFICATIONS NEEDED TO TEACH THIS COURSE:
MEMBER OF THE GRADUATE FACULTY OF FAU AND HAS A TERMINAL DEGREE IN THE SUBJECT AREA (OR A CLOSELY RELATED FIELD).

| Faculty contact, email and complete phone number: | Please consult and list departments that might be affected by the new course and attach comments.[3] |
|---|---|
| Yuan Wang, ywang@fau.edu, 561-297-3317 | |

| *Approved by:* | *Date:* |
|---|---|
| Department Chair: A. Hurter | 8/25/16 |
| College Curriculum Chair: | 10/21/16 |
| College Dean: Dr. Charles Roberts | 10/21/2016 |
| UGPC Chair: | |
| Graduate College Dean: | |
| UFS President: | |
| Provost: | |

1. **Syllabus** must be attached; see guidelines for requirements: *www.fau.edu/provost/files/course syllabus.2011.pdf*
2. Review **Provost Memorandum: Definition of a Credit Hour** *www.fau.edu/provost/files/Definition Credit_Hour_Memo_2012.pdf*
3. **Consent** from affected departments (attach if necessary)

Email this form and syllabus to *UGPC@fau.edu* **one week before** the University Graduate Programs Committee meeting.

## Syllabus

| 1. COURSE TITLE | COURSE NUMBER | CREDIT HOURS |
|---|---|---|
| Algebraic Curves | MAS 6310 | 3 |

**2. COURSE PREREQUISITES**
MAS 5311 and MAS 5312 (Introductory Abstract Algebra 1 and 2) with a grade of "C" or higher

**3. COURSE LOGISTICS**

a. Spring 2018.
b. Taught in lecture-discussion style in-person (not online).
c. Course location is specified in the FAU course schedule.

**4. INSTRUCTOR CONTACT INFORMATION**
Lee Klingler, Office SE 228
Phone: (561) 297-3257, fax (561) 297-2436
E-mail address: klingler@fau.edu
Office hours: TBA

**5. TA CONTACT INFORMATION**
N/A

**6. COURSE DESCRIPTION**
An introduction to algebraic curves. Topics include affine algebraic sets and varieties, local properties of plane curves, projective varieties, morphisms and rational maps.

**7. COURSE OBJECTIVES**

This course is an introduction to the interrelations between the algebra and the geometry of zero-sets of polynomials in the complex plane; the topics students learn in this course are part of the standard tool kit of all mathematicians specializing in algebraic geometry. Upon successful completion of the course, students will have learned the basic theory of algebraic curves and be prepared to take advanced courses in algebraic geometry.

**8. COURSE EVALUATION METHOD**
There will be three homework projects $\{H_1, H_2, H_3\}$, each having a maximum score of 20 points. Homework project $H_1$ will be assigned in the 3rd week of classes, homework project $H_2$ will be assigned in the 7th week of classes, and homework project $H_2$ will be assigned in the 11th week of classes. The exact assignment due date will be specified on each assignment. Graded homework projects will be returned in class or can be picked up during office hours in the instructor's office.
In addition, there is a cumulative final exam, which is scheduled in accordance with FAU's final exam schedule. The maximum score for the final exam is 40 points.

**9. COURSE GRADING SCALE**
Your overall grade in the course is derived from your cumulative performance as follows:
1) The points from the items $H_1$, $H_2$, $H_3$ and the final exam are added, yielding a final number of points $0 \le P \le 100$.
2) Your grade is derived from $P$ according to the following table.

| Value of $P$ | Grade |
|---|---|
| >94 | *A* |
| >90 – 94 | *A-* |
| >87 – 90 | *B+* |
| >83 – 87 | *B* |
| >80 – 83 | *B-* |

| | |
|---|---|
| >75 – 80 | *C+* |
| >65 – 75 | *C* |
| >60 – 65 | *C-* |
| >57 – 60 | *D+* |
| >53 – 57 | *D* |
| >50 – 53 | *D-* |
| <50 | *F* |

**10. POLICY ON MAKEUP TESTS, LATE WORK, AND INCOMPLETES**

If you cannot complete an assignment in due time to a relevant and documented reason, you can make up the respective assignment. Extra credit work is not possible.

A grade of *I* (incomplete) will only be given under certain conditions and in accordance with the academic policies and regulations put forward in FAU's University Catalog. The student has to show exceptional circumstances why requirements cannot be met. A request for an incomplete grade has to be made in writing with supporting documentation, where appropriate.

**11. SPECIAL COURSE REQUIREMENTS**

N/A

**12. CLASSROOM ETIQUETTE POLICY**

N/A

**13. DISABILITY POLICY STATEMENT**

In compliance with the Americans with Disabilities Act (ADA), students who require special accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS) located in Boca Raton - SU 133 (561-297-3880), in Davie - MOD I (954-236-1222), in Jupiter - SR 117 (561-799-8585), or at the Treasure Coast - CO 128 (772-873-3305), and follow all OSD procedures.

**14. CODE OF ACADEMIC INTEGRITY POLICY STATEMENT**

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty, including cheating and plagiarism, is considered a serious breach of these ethical standards, because it interferes with the University mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the University community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see University Regulation 4.001 at http://www.fau.edu/ctl/4.001_Code_of_Academic_Integrity.pdf .

**15. REQUIRED TEXTS/READINGS**

A standard textbook for the course is *Plane Algebraic Curves,* by G. Orzech and M. Orzech, Marcel Dekker (1981).

**16. SUPPLEMENTARY READINGS**

The following references can supplement the material covered in class.

- *Algebraic Curves,* by William Fulton, W. A. Benjamin (1969).
- *Algebraic Geometry,* by Robin Hartshorne, Springer-Verlag (1977).

**17. COURSE TOPICAL OUTLINE**

The following topics are to be covered. The exact duration per topic will vary in dependence on prior experience of the class participants, but a typical duration per topic is three weeks.

1) Affine algebraic sets: affine space, ideal of a set of points, Hilbert Basis Theorem, irreducible components, Hilbert's Nullstellensatz, modules and finiteness conditions, integral elements, field extensions.
2) Affine varieties: coordinate rings, polynomial maps, coordinate changes, rational functions and local rings, DVR's, forms, direct products, operations with ideals, quotient modules and exact sequences, free modules.

3) Local properties of plane curves: multiple points and tangent lines, multiplicities and local rings, intersection numbers.
4) Projective varieties: projective space, projective algebraic sets, affine and projective varieties, multiprojective space.
5) Morphisms and rational maps: the Zariski topology, morphisms of varieties, products and graphs, algebraic function fields and dimension, rational maps of curves.

**18. WEEKLY SCHEDULE**

Week #1: Read Chapter 1 of the textbook.
Week #2: Read Chapter 2 of the textbook. Turn in Exercises #14, 15, 16, 17, pages 14-15 of the textbook.
Week #3: Read Chapter 3 of the textbook. Turn in Exercises #15, 16, 17, 18, page 30 of the textbook.
Week #4: Read Chapter 4 of the textbook. Turn in Exercises #8, 9, 10, 11, pages 40-41 of the textbook.
Week #5: Read Chapter 5 of the textbook. Turn in Exercises #12, 13, 14, 15, pages 49-50 of the textbook.
Week #6: Read Chapter 6 of the textbook. Turn in Exercises #20, 21, 22, 23, pages 67-68 of the textbook.
Week #7: Read Chapter 7 of the textbook. Turn in Exercises #18, 19, 20, 21, pages 85-86 of the textbook.
Week #8: Read Chapter 8 of the textbook. Turn in Exercises #5, page 92 of the textbook.
Week #9: Read Chapter 9 of the textbook. Turn in Exercises #15, 16, 17, 18, pages 107-108 of the textbook.
Week #10: Read Chapter 10 of the textbook. Turn in Exercises #8, 9, page 121 of the textbook.
Week #11: Read Chapter 11 of the textbook. Turn in Exercises #6, 7, 8, 9, pages 126-127 of the textbook.
Week #12: Read Chapter 12 of the textbook. Turn in Exercises #8, 9, page 132 of the textbook.
Week #13: Read Chapter 13 of the textbook. Turn in Exercises #6, 7, pages 135-136 of the textbook.
Week #14: Read Chapter 14 of the textbook. Turn in Exercises #6, 7, page 140 of the textbook.
Week #15: Read Chapter 15 of the textbook. Turn in Exercises #5, 6, page 152 of the textbook.