Course Change Request

New Course Proposal

Date Submitted: 08/30/19 1:36 pm

Viewing: MATH 725 : Algebraic Geometry

Last edit: 08/30/19 1:36 pm

Changes proposed by: igriva

Are you completing this form on someone else's behalf?

No

Effective Term:	Fall 2020		
Subject Code:	MATH - Mathematics	**Course Number:**	725
Bundled Courses:			
Is this course replacing another course?	No		
Equivalent Courses:			
Catalog Title:	Algebraic Geometry		
Banner Title:	Algebraic Geometry		
Will section titles vary by semester?	No		
Credits:	3		
Schedule Type:	Lecture		
Hours of Lecture or Seminar per week:	3		
Repeatable:	May be only taken once for credit, limited to 3 attempts (N3)	**Max Allowable Credits:**	3
Default Grade Mode:	Graduate Regular		
Recommended Prerequisite(s):	MATH 724: Commutative Algebra		
Recommended Corequisite(s):			
Required Prerequisite(s) / Corequisite(s) (Updates only):	MATH 621: Algebra I		

Registrar's Office Use Only - Required Prerequisite(s)/Corequisite(s):

And/Or	(	Course/Test Code	Min Grade/Score	Academic Level	)	Concurrency?

Registration Restrictions (Updates only):

Registrar's Office Use Only - Registration Restrictions:

In Workflow

1. **MATH Chair**
2. **SC Curriculum Committee**
3. SC Associate Dean
4. Assoc Provost-Graduate
5. Registrar-Courses
6. Banner

Approval Path

1. 09/03/19 4:35 pm David Walnut (dwalnut): Approved for MATH Chair

Field(s) of Study:

Class(es):

Level(s):

Degree(s):

School(s):

Catalog Description: This course is an introduction to Algebraic Geometry. Topic include: Affine Varieties, Projective Varieties, Morphisms, Rational Maps, Nonsingular varieties and curves, Sheaves, Schemes, Divisors, Projective Morphisms, Differentials, Sheaf Cohomology.

Justification: We propose adding this course to the regular roster of courses. It has run a few times in the past with students interested in the topic as a "special topics" course. The content is foundational to students in geometry and algebra, and will have broad application to students working with faculty in these areas. Having a regular course will allow these students to progress more quickly in the PhD program.

If this course is offered immediately after Commutative Algebra and is marketed as a natural "next course", then it is expected that this course will regularly obtain needed enrollment to run.

Does this course cover material which crosses into another department? No

Learning Outcomes:

Student will learn important topics in algebraic geometry that will prepare them for further study in mathematics, and applied fields such as cryptography, phylogenetics, and robotics. After taking this course students will be prepared for research in algebraic geometry and related areas in mathematical science.

Attach Syllabus AlgebraicGeometrySyllabusGeneric.pdf

Additional Attachments

Staffing: There are 5 faculty members in the department of mathematical sciences that can teach this course.

Relationship to Existing Programs: None.

Relationship to Existing Courses: None.

Additional Comments:

Reviewer Comments

Key: 16495

GEORGE MASON UNIVERSITY

SYLLABUS

Department of Mathematical Sciences

Algebraic Geometry

Possible Texts:

1. *Algebraic Geometry*, Springer GTM, by Robin Hartshorne [Supplementary Text]
2. *The Red Book of Varieties and Schemes*, Springer LNM, by David Mumford
3. *Basic Algebraic Geometry 1: Varieties in Projective Space,* Springer-Verlag, by Igor Shafarevich
4. Vakil's Notes: https://math.stanford.edu/~vakil/725/course.html
5. Milne's Notes: https://www.jmilne.org/math/CourseNotes/AG.pdf
6. Dolgachev's Notes: http://www.math.lsa.umich.edu/~idolga/631.pdf

General Description: Algebraic Geometry is a way to view rings and other algebraic objects as geometric objects. It is also a way to use algebraic methods to study naturally geometric objects (that happen to be "varieties"). This interplay between algebra and geometry gives rise to a useful and power theory that has applications in many areas of science as well as other areas of mathematics. This course covers the foundational definitions of varieties in both the affine and projective settings, an introduction to schemes and their properties, the natural maps between these objects, and the correspondence to rings and ring maps.

(Catalog) Description: Affine Varieties, Projective Varieties, Morphisms, Rational Maps, Nonsingular varieties and curves, Sheaves, Schemes, Divisors, Projective Morphisms, Differentials, Sheaf Cohomology.

Pre-Requisite: Commutative Algebra (MATH 724)

Suggested Course Number: MATH 725

Motivation

We propose adding this course to the regular roster of courses. It has run a few times in the past with students interested in the topic as a "special topics" course. The content is foundational to students in geometry and algebra, and will have broad application to students working with faculty in these areas. Having a regular course will allow these students to progress more quickly in the PhD program.

This course was offered in Fall 2015 (8 students enrolled) and Spring 2017 (as a reading course). If this course is offered immediately after Commutative Algebra and is marketed as a natural "next course", then it is expected that this course will regularly obtain needed enrollment to run (min. 5 students).