

Prerequisite   Prerequisite: Admission to the PhD-MTH program.   Required Background: Basic knowledge of ring theory and field theory.	Α	Course Number & Title	MTH 733 - Commutative Algebra								
C Number of credits D Faculty Name E Term/ Year F Sections  CRN Days Time Location 20503 MW 1819:15 Nab 06  CRN Days Time Location NAB262 abadawi@aus.edu  Office Hours:  • MW: 1415:15 and TR 12:4013:40 • Or by appointment just email me  Course Description from Catalog Outcomes and Assessment Instruments  I Course Learning Outcomes and Assessment Instruments  I Course Learning Outcomes  Upon completion of this course, students will be able to:  1. Produce proofs of fundamental theorems of commutative algebra and use them to solve problems.  Learning Outcomes  Upon completion of this course, students will be able to:  1. Produce proofs of fundamental theorems of commutative algebra and use them to solve problems.  Learning Outcomes  Upon completion of this course, students will be able to:  1. Produce proofs of fundamental theorems of commutative algebra and use them to solve problems.  Primary: Class Notes  A. Analyze different types of matrix forms  J Textbook and other instructional Material and Resources  K. Teaching and Leagring Methodologies  M. Atiyah and I. Macdonald (2018). Introduction to Commutative Algebra. CRC Press. eBook ISBN 978-0-4294-9363-8  T. W. Hungerford (2012): Algebra; Springer, eBook ISBN: 10.1007/978-1-4612-6101-8  The course Learning Outcomes  M. Atiyah and I. Macdonald (2018). Introduction to Commutative Algebra. CRC Press. Whiteboard, markers, formal lectures, oral presentations, and class discussion  Grading Scale, Grading Distribution, and Due Dates  Grading Scale  90.00 - 100	В	Prerequisite	Prerequisite: Admission to the PhD-MTH program.								
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		Grading Distribution		
		Assessment	Weight	Due Date (Week #)
		Homework	22%	TBA
		Exam 1	22%	TBA
		Exam 2	22%	TBA
		Final Exam	34%	TBA
		Total	100%	
M	Explanation of Assessments	First exam: There w Second exam: There 11.	ork Assignments will be assigned to till be one written exam for the ewill be one written exam for the ewill be one written exam for the tamination will be comprehensing the	material up to week 5. the material up to week
N	Student Academic Integrity Code Statement	Students MUST read the Student Academic Integrity Code outlined in the AUS graduate Catalog and abide by the standards for academic conduct, students' rights and responsibilities, and procedures for handling allegations of academic dishonesty.		
0	Generative Al Course Policy	It is considered an academic in intelligence tool as your own w	tegrity violation to represent outp ork.	ut of a generative artificial

## **SCHEDULE\***

#	WEEK	TOPICS & ASSIGNED READING	NOTES
1		Prime ideals, localization of rings, and integral extension	Chapter one, Chapter 5 Class Notes (crucial)
2		Prime ideals, localization of rings, and integral extension II	Chapter one, Chapter 5 Class Notes (crucial)
3		Noetherian rings I	Chapters 6, 7 Class notes (crucial)
4		Noetherian rings II	Chapters 6, 7, class notes (crucial)



5	Artinian commutative rings	Chapter 8, class notes (crucial)
6	Module , the exact sequence, and Nakayama's lemma I	Exam 1 Chapters 2, 3, 4 Class Notes (Crucial)
7	Module, the exact sequence, and Nakayama's lemma II	Chapters 2, 3, 4 Class Notes (Crucial)
8	Module, the exact sequence, and Nakayama's lemma III	Chapters 2, 3, 4 Class Notes (Crucial)
9	Module, the exact sequence, and Nakayama's lemma IV	Chapters 2, 3, 4 Class Notes (Crucial)
10	Matrices over commutative rings I	Class Notes Hungerford, Chapter 7
11	Matrices over commutative rings II	Class Notes Hungerford, Chapter 7
12	Matrices over commutative rings III	Exam 2
13	Matrices over commutative rings IV	Class Notes Hungerford, Chapter 7
14	Matrices over commutative rings V	Class Notes Hungerford, Chapter 7



15		Discussion of open problems related to the materials discussed in the course	Research papers
16	FINAL EXAM		Compressive

<sup>\*</sup> The teaching schedule is subject to change at the instructor's discretion, and students will be informed accordingly.

## **Contribution of Course to Program Outcomes**

This course contributes to the accomplishment of the following program outcomes:

Program Outcome	Course Learning Outcomes
Demonstrate mastery of comprehensive, deep, and overarching knowledge of at least two main areas of mathematics such as algebra, analysis, dynamical systems, and statistics	1, 3
Apply advanced mathematical skills to solve problems and communicate solutions in precise mathematical language	1, 3, 4
Design, conduct and defend independent and original research in a specialized area of mathematics	1, 2, 3, 4
Effectively disseminate and communicate research outcomes to relevant audiences in both written and oral formats	1, 2, 3, 4
Uphold standards of ethical academic and professional conduct	1, 3, 4