數學系課程核心教材內容

課程名稱：(中文) 交換代數導論(一) (英文) Introduction to commutative algebra (I)				開課單位	數學碩博班
				課程代碼	2405307
學分數	3	必/選修	選修	開課年級	二

教學目標：

In this course, we expect students to learn some basic and higher knowledge of commutative algebras

課程概述：

In this course, we introduce many important theorems of commutative algebra including various Noetherian rings and numerical notions of commutative algebra

先修科目或先備能力：代數通論(一)(二)

建議參考書目	1. *Introduction to Commutative Algebra*, Atiyah and Macdonald 或交換代數導論 王心如撰 2. *Commutative algebra with a view toward algebraic geometry*, D. Eisenbud, Graduate texts in mathematics 150, Sriinger

課程大綱

單元主題	內容綱要	上課週數
Rings and ideals	1. Rings and ring homomorphisms. 2. Ideals and Quotient rings. 3. Zero-divisors and nilpotent elements. ● Zero-divisors, nilpotent elements . ● Nilradical and Jacobson radical. ● Operations on ideals. ● Extension and contraction. ● Spec(***R***)	4 weeks
Modules	1. Modules and module homomorphisms. 2. Submodules and quotient modules.	4 weeks
Ring extensions	1. Rings and modules of fractions. 2. Local properties. 3. Integral extensions.	4 weeks
Noetherian and Artinian rings	1. Chain conditions. 2. Noetherian rings and modules. 3. Artinian rings	4 weeks

數學系課程核心教材內容

課程名稱：(中文) 交換代數導論(二) (英文) Introduction to commutative algebra (II)				開課單位	數學碩博班
				課程代碼	2405308
學分數	3	必/選修	選修	開課年級	二

教學目標：

In this course, we expect student to learn some basic and higher knowledge of commutative algebras

課程概述：

In this course, we introduce many important theorems of commutative algebra including various Noetherian rings and numerical notions of commutative algebra.

先修科目或先備能力：代數通論(一)(二)，交換代數導論(一)

建議參考書目	1. *Introduction to Commutative Algebra*, Atiyah and Macdonald 或交換代數導論 王心如撰 2. *Commutative algebra with a view toward algebraic geometry*, D. Eisenbud, Graduate texts in mathematics 150, Sriinger

課程大綱

單元主題	內容綱要	上課週數
Primary decompositions	Primary decompositions of ideals and of modules.	2 weeks
Noetherian rings I	Discrete valuation rings and Dedekind domains	3 weeks
Heights, depths and dimensions	Height. dimensions, depth and regular sequences (optional)	3 weeks
Noetherian rings II	Cohen-Macauly rings, Gorenstein rings and regular rings (optional)	3 weeks
Modules, Revisited	Projective modules, injective modules, flat modules, tensor product of modules modules and Direct limits	3 weeks
Grobner bases	Monomial orders and Grobner bases (optional)	2 weeks
Principal ideal theorem	Principal ideal theorem and applications (optional)	4 weeks