

數學系課程核心教材內容

課程名稱：(中文) 高等線性代數 (英文) Advanced Linear Algebra			開課單位	學士班
			課程代碼	2104003
學分數	3	必/選修	選修	開課年級
四				
<p>教學目標：</p> <p>In this course, we expect to go over all the fundamentals on (possibly infinite dimensional) vector spaces over arbitrary fields. This will be a suitable preparation for all the graduate courses in any mathematical disciplines.</p> <p>課程概述：</p> <p>We will prove all the fundamental theorems regarding bases and dimensions of vector spaces. This will also include discussion on cardinality and Zorn's lemma. We will also discuss canonical forms in great details.</p> <p>先修科目或先備能力：代數(一)(二)，最好再加上近世代數</p>				
建議參考書目	<ol style="list-style-type: none"> 1. <i>Linear Algebra</i>, Larry Smith 2. <i>Basic algebra I</i>, N. Jacobson 			

課程大綱

單元主題	內容綱要	上課週數
Vector spaces	<ol style="list-style-type: none"> 1. Definitions and examples 2. Linear combination. Linear independence. Bases 3. Cardinality and its arithmetics 4. Zorn's lemma 5. Bases 6. Dimension 	5 weeks
Modules	<ol style="list-style-type: none"> 1. Definitions and examples 2. Free modules and matrices 3. Structure theorem of finitely generated modules over a PID 	5 weeks
Groups	<ol style="list-style-type: none"> 1. Fundamental theorem of finitely generated abelian groups (optional) 	1 weeks
Canonical forms	<ol style="list-style-type: none"> 1. Rational forms 2. Jordan forms 	4 weeks