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## ② 图 z 東華大學 教學計劃表 Syllabus

		<b>教</b> 与	百計劃衣	<b>Sy</b> 11	abus			
	名稱(中文) me in Chinese	數學專論(一)			學年/學期 Academic Year/Sen	mester	114/1	
	名稱(英文) me in English	Topics in Mathematics (I)						
	-目代碼 rse Code	系級 開課單位 AM_53200 Department				應用數學系		
	修別 Type	選修 Elective	.0/3.0					
	課教師 tructor	/李自然						
	修課程 equisite							
課程描述 Course Description								
This course	e is an introduc	tion to Lie gro	oups and Lie a	algebras.				
		課	程目標 Cours	se Objecti	ives			
由任課教師專長區分,設定個別目標。 Course objectives are subject to the expertise of the instructor.								
系專業能力 Basic Learning Outcomes						Cor	程目標與系專業能 力相關性 relation between urse Objectives and Dept.'s Education Objectives	
A 具備專業數學知識及邏輯推理能力。Have well-founded expertise in mathematics and be capable of logical reasoning.							•	
B 具備學習其它學科的能力,以期能邁向跨領域研究。Be able to study other fields of science so as to conduct interdisciplinary research in the future						0		
C 具備獨立思考與解決問題的能力。 Be capable of independent thinking and have the problem-solving skills.						•		
圖示說明Illustration : ● 高度相關 Highly correlated ○中度相關 Moderately correlated								
		授課進	度 表 Teaching	g Schedule	e & Content			
週次Week	eek 内容 Subject/Topics					備註Remarks		
1	1 2025/9/9: Introduction: Galois theory and Lie theory							
2	2 9/16: Prolongation							
3	3 9/23: (No class due to typhoon)							
4	4 9/30: Symmetry groups of differential equations							
5	5 10/7: Lie algebras. The matrix exponential							
6	6 10/14: Matrix Lie groups							
7	7 10/21: The Baker - Campbell - Hausdorff formula							
8	8 10/28: The exponential map. Local homomorphisms							

9	11/4: Midterm Exam					
10	11/11: Analytic subgroups. Lie's third theorem					
11	11/18: Root systems					
12	11/25: Semisimple Lie algebras and their representations (I)					
13	12/2: Semisimple Lie algebras and their representations (II)					
14	12/9: Examples of representations of Lie groups					
15	12/16: Compact Lie groups					
16	12/23: Representations of compact Lie groups					
17	12/30: Final Exam					
18	2026/1/6: Octonions and exceptional Lie groups					
教學策略 Teaching Strategies						
✓ 課堂講授 Lecture      分組討論Group Discussion     參觀實習 Field Trip						
其他Miscellaneous:						
教學創新自評 Teaching Self-Evaluation						
創新教學(Innovative Teaching)						
問題導向學習(PBL) 團體合作學習(TBL) 解決導向學習(SBL)						
翻轉教室 Flipped Classroom 磨課師 Moocs						
社會責任(Social Responsibility)						
在地實踐Community Practice						
跨域合作(Transdisciplinary Projects)						
■ 跨界教學Transdisciplinary Teaching ■ 跨院系教學Inter-collegiate Teaching						
業師合授 Courses Co-taught with Industry Practitioners						
其它 other:						

學期成績計算及多元評量方式 Grading & Assessments									
配分項目	配分比例 Percentage	多元評量方式 Assessments							
Items		測驗 會考	實作 觀察	口頭 發表	專題 研究	創作 展演	卷宗 評量	證照 檢定	其他
平時成績(含出缺席) General Performance (Attendance Record)									
期中考成績 Midterm Exam	25%								
期末考成績 Final Exam	25%								
作業成績 Homework and/or Assignments	50%								
其他 Miscellaneous									

評量方式補充說明

Grading & Assessments Supplemental instructions

## 教科書與參考書目(書名、作者、書局、代理商、說明)

Textbook & Other References (Title, Author, Publisher, Agents, Remarks, etc.)

## References:

- -- John C. Baez, The Octonions, Bulletin (New series) of the American Mathematical Society, Volume 39, Number 2, Pages 145-205
- -- Brian C. Hall, Lie Groups, Lie Algebras, and Representations: An Elementary Introduction, Second Edition, Springer International Publishing
- -- Alexander A. Kirillov, Jr, An Introduction to Lie Groups and Lie Algebras, Cambridge University Press
- -- Anthony W. Knapp, Basic Algebra, Digital Second Edition. Available on the author's website (https://www.math.stonybrook.edu/~aknapp/)
- -- Anthony W. Knapp, Lie Groups Beyond an Introduction, Digital Second Edition. Available on the author's website (https://www.math.stonybrook.edu/~aknapp/)
- -- Yvette Kosmann Schwarzbach (translated by Stephanie Frank Singer), Groups and Symmetries: From Finite Groups to Lie Groups, Second Edition, Springer Nature
- -- Peter J. Olver, Applications of Lie Groups to Differential Equations, Second Edition, Springer-Verlag
- -- Peter J. Olver, Introduction to Partial Differential Equations, Springer International Publishing

課程教材網址(含線上教學資訊,教師個人網址請列位於本校內之網址)

Teaching Aids & Teacher's Website(Including online teaching information.

Personal website can be listed here.)

其他補充說明(Su	oplemental	instructions)
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