

Course Information	
Course title	Android Virtual Machines and Compilers
Semester	102-2
Designated for	COLLEGE OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE GRADUATE INSTITUTE OF NETWORKING AND MULTIMEDIA
Instructor	STEVEN LIAO
Curriculum Number	CSIE5312
Curriculum Identity Number	922 U4190
Class	
Credits	3
Full/Half Yr.	Half
Required/ Elective	Elective
Time	Monday ABC
Remarks	Limited to undergraduate students of sophomore year and beyond The upper limit of the number of students: 160.
Table of Core Capabilities and Curriculum Planning	Table of Core Capabilities and Curriculum Planning
Course Syllabus	
Please respect the intellectual property rights of others and do not copy any of the course information without permission	
Course Description	由 Android Runtime 原作者之一親自講授 Android 虛擬機及執行系統，獨家還原 Google 設計的準則與取舍，解開人手一隻的 Android 到底是如何 work。本課不同於其

	<p>他虛擬教法，而是切入真實的虛擬機，以求學生玩真的，學到位。</p> <p>本課包含 Android 最新公開的 runtime LLVM compiler 及 Quick compiler。我們十分興奮終於在 Unix 系統在台大開課三十多年後，開始有 Android 系統的課，尤其在平台化及 Ecosystem 導向的趨勢下，Android 系統已超過 13 億台以及 Android apps 過百萬個，掌握 Android 平台技術非常重要。</p>
Course Objective	<p>本課程的 goal: 培養同學全面掌握 Android 系統開發之基本能力，鼓勵同學投入發展國際級的 Open Source 系統，有機會從國際級開發大師案例學習經驗。掌握 Android 平台技術來擴展學生的學涯及職涯境界。</p> <p>本課程的 non-goal: 獨立 android apps。本課主打系統及其附帶 apps。</p>
Course Requirement	
Office Hours	
References	<p>Virtual Machines: Versatile Platforms for Systems and Processes. Jim Smith & Ravi Nair, 2005.</p> <p>Compilers: Principles, Techniques, and Tools, Aho, Lam, Sethi, Ullman, 2006.</p>
Designated reading	source.android.com
Grading	
Progress	

Week	Date	Topic
第 1 週	2/17	(1) Android overview (2) Key Trend: Large application System (3) System Virtual Machine
第 2 週	2/24	(1) Process Virtual Machine (2) Android emulator (3) High-level language Virtual Machine
第 3 週	3/03	(1) Low-level Virtual Machine (2) Dalvik VM design and concept
第 4 週	3/10	(1a) Dalvik instruction (1b) Dalvik Executable (2) Zygote (3) Compiler toolchain and build rules (4) Class loading and verification
第 5 週	3/17	(1) Dex optimization: Dx Tool (2) Dex optimization: DexOpt and Odex
第 6 週	3/24	(1) Fast interpreter (2) JIT compiler (a): Tracing compiler
第 7 週	3/31	(1) JIT compiler (b): Code generator (2) JIT compiler (c): Optimization
第 8 週	4/07	(1) Android's ART runtime (2) Method JIT (a): Design tradeoff
第 9 週	4/14	Midterm Exam
第 10 週	4/21	(1) Method JIT (b): Optimization (2) Method JIT (c): Fingerprinting and selective compilation
第 11 週	4/28	(1) Garbage collection (a): Android GC
第 12 週	5/05	(1) Garbage collection (b): Concurrent GC (2) Garbage collection (c): Generational GC
第 13 週	5/12	Android Compilers: GCC and LLVM
第 14 週	5/19	RenderScript and LLVM
第 15 週	5/26	(1) OpenCL and LLVM (2) Language models for Android compute (3) Translators: RS2CL, O2render
第 16 週	6/02	Dragon Boat Festival (No Class)
第 17 週	6/09	NDK and LLVM vs. Android fragmentation