114 National University of Tainan (NUTN)
Department of Applied Mathematics Course Framework

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1. Educational Objectives
The department aims to cultivate talents in two main areas: "Applied Mathematics and Data Science" and "Mathematics Education."
2. General Education Requirements Total: 30 credits.
• Core Compulsory Courses: 12 credits.
• Field Elective Courses: Students must complete courses in at least 3 out of the 4 major fields.
3. Departmental Curriculum Structure
Students are required to complete the "Department Core" and "At Least One Module."</td></tr>
</table>

	• (1) Department Core: 49 credits of Compulsory courses and 14 credits of Elective courses. • (2) Module Electives: 1. Module I: Applied Mathematics and Data Science: 15 elective credits. 2. Module II: Mathematics Education: 15 elective credits. • (3) Free Electives: The following may be counted toward graduation credits: 1. Professional courses offered by the department. 2. Professional courses from other departments within the university (excluding online courses). 3. Professional courses from other national or international universities (including online courses). 4. General Education courses (maximum 2 credits applicable). 5. Teacher Training (Teacher Education) courses (maximum 10 credits applicable). o *Note: Online courses must be approved by the Department Curriculum Committee to be recognized.* 4. Double Major Requirements Students from other departments pursuing a Double Major must complete at least 45 credits in this department (including at least 27 credits from the Double Major Required/Elective list). 5. Minor Requirements Students from other departments pursuing a Minor must complete at least 20 credits in this department (including at least 14 credits from the Minor Required/Elective list).

Departmental Core Courses：

Category	No.	Course Code	Course Name	Type	Credits	Hours	Semester	Remarks
(R)	1	KO1240	Calculus (I)	(R)	4	4	Year 1 Fall	Departmental Core Compulsory Courses: 49 credits.
	2	KO1134	Calculus (II)	(R)	4	4	Year 1 Spring	
	3	KO1241	Linear Algebra (I)	(R)	3	3	Year 1 Fall	
	4	KO1242	Linear Algebra (II)	(R)	3	3	Year 1 Spring	
	5	KO1105	Discrete Mathematics	(R)	3	3	Year 1 Fall	
	6	KO1150	Introduction to Computer	(R)	3	3	Year 1 Fall	
	7	KO1148	Introduction to Mathematical Education	(R)	2	2	Year 1 Fall	
	8	KO1155	Computer Programming	(R)	3	3	Year 1 Spring	
	9	KO1033	Algebra (I)	(R)	3	3	Year 2 Fall	
	10	KO1225	Differential Equations	(R)	3	3	Year 2 Fall	
	11	KO1052	Advanced Calculus (I)	(R)	4	4	Year 2 Fall	
	12	KO1054	Advanced Calculus (II)	(R)	4	4	Year 2 Spring	
	13	KO1038	Probability Theory	(R)	3	3	Year 2 Spring	
	14	KO1243	Mathematical Statistics	(R)	3	3	Year 3 Fall	

Category	No.	Course Code	Course Name	Type	Credits	Hours	Semester	Remarks
	15	KO1271	Special Topics Practice (I)	(R)	2	2	Year 3 Fall	
	16	KO1272	Special Topics Practice (II)	(R)	2	2	Year 3 Spring	
(E)	17	KO1086	Introduction to Mathematics	(E)	3	3	Year 1	Departmental Core Elective Courses 14Credits。
	18	KO1130	Number Theory	(E)	3	3	Year 1	
	19	KO1223	History of Mathematics	(E)	3	3	Year 1	
	20	KO1247	Mathematics for Computer Science	(E)	3	3	Year 1	
	21	KO1244	3D Printing and Visualization of Mathematics	(E)	3	3	Year 1	
	22	KO1198	Vector Calculus	(E)	3	3	Year 2	
	23	KO1238	Fundamentals of Machine Learning for Mathematics	(E)	3	3	Year 2	
	24	KO1226	Game Design of Graph Theory	(E)	3	3	Year 2	
	25	KO1056	Algebra (II)	(E)	3	3	Year 2	
	26	KO1037	Geometry	(E)	3	3	Year 3	
	27	KO1202	Advanced Linear Algebra	(E)	3	3	Year 3	
	28	KO1249	Introduction to Artificial Intelligence	(E)	3	3	Year 3	
	29	KO1080	Complex Analysis	(E)	3	3	Year 3	
	30	KO1222	Mathematics and Computer	(E)	3	3	Year 3	
	31	KO1245	Human–robot Collaboration in Mathematics	(E)	3	3	Year 3	
	32	KO1197	Introduction to Partial Differential Equations	(E)	3	3	Year 3	
	33	KO1273	Mixed Reality Technology	(E)	2	2	Year 3	
	34	KO1124	Introduction of Financial Mathematics	(E)	3	3	Year 3	
	35	KO1266	The Study of Works in Mathematics Exhibition	(E)	2	2	Year 4	

- **Module Courses I: Applied Mathematics and Data Science Module**

Category	No.	Course Code	科 目 名 稱	Type	Credits	Hours	Semester	Remarks
(E)	1	KO1095	Fundamental Graph Theory	(E)	3	3	Year 2	At least 15 elective (E) credits must be completed from the Applied Mathematics and Data Science Module.
	2	KO1181	Object-oriented Programming	(E)	3	3	Year 2	
	3	KO1022	Data Structure	(E)	3	3	Year 2	
	4	KO1217	Coding Theory	(E)	3	3	Year 2	
	5	KO1248	Data Analysis	(E)	3	3	Year 2	
	6	KO1158	Introduction to Dynamical Systems	(E)	3	3	Year 2	
	7	KO1118	Numerical Analysis	(E)	3	3	Year 2	
	8	KO1079	Operation Research	(E)	3	3	Year 3	
	9	KO1227	Introduction to Cryptography	(E)	3	3	Year 3	
	10	KO1250	Mathematics for Data Science	(E)	3	3	Year 3	
	11	KO1157	Introduction to Analysis	(E)	3	3	Year 3	
	12	KO1119	Combinatorics	(E)	3	3	Year 3	
	13	KO1229	Game Theory	(E)	3	3	Year 3	
	14	KO1234	Statistical analysis of Big data	(E)	3	3	Year 3	
	15	KO1268	Introduction to FinTech	(E)	3	3	Year 3	
	16	KO1237	Financial Big Data Analysis	(E)	3	3	Year 3	
	17	KO1256	Mathematics of Compound Interest	(E)	3	3	Year 3	
	18	KO1189	Introduction to Scientific Computing	(E)	3	3	Year 4	
	19	KO1258	Introduction to Insurance Mathematics	(E)	3	3	Year 4	
	20	KO1246	Mathematical Modeling	(E)	3	3	Year 4	
	21	KO1232	Introduction to Applied Mathematics	(E)	3	3	Year 4	
	22	KO1125	Application of Financial Mathematics	(E)	3	3	Year 4	

Module Courses II: Mathematics Education Module

Category	No.	Course Code	Course Name	Type	Credits	Hours	Semester	Remarks
(E)	1	KO1006	General Mathematics	(E)	2	2	Year 1	At least 15 elective (E) credits must be completed from the Mathematics Education Module.
	2	KO1032	The Development of Mathematics Concept	(E)	3	3	Year 2	
	3	KO1267	Game Programming of Mathematics	(E)	2	2	Year 2	
	4	KO1120	The Psychology of Mathematics Learning	(E)	3	3	Year 2	
	5	KO1138	Mathematics Content Analysis in Elementary and Junior High School	(E)	3	3	Year 2	
	6	KO1261	Digital Learning System	(E)	2	2	Year 2	
	7	KO1264	Mathematical Competence and Exploration Teaching	(E)	2	2	Year 2	
	8	KO1239	The Design and Practice of Exploration Education in Mathematics	(E)	3	3	Year 2	
	9	KO1270	Instructional Materials and Practice on Teaching Computer Science	(E)	2	2	Year 2	

Category	No.	Course Code	Course Name	Type	Credits	Hours	Semester	Remarks
	10	KO1007	Teaching Materials and Methods of Elementary school Mathematics	(E)	2	2	Year 3	
	11	KO1274	Teaching and Assessment in Mathematics	(E)	3	3	Year 3	
	12	KO1233	Mathematical thinking and problem solving	(E)	3	3	Year 3	
	13	KO1147	Diagnosis of Mathematics Learning	(E)	3	3	Year 3	
	14	KO1144	Innovation Design in Mathematics	(E)	3	3	Year 3	
	15	KO1127	Mathematics Gifted Education	(E)	3	3	Year 3	
	16	KO1263	Mathematics Remedial Instruction	(E)	3	3	Year 3	
	17	KO1269	Application of Artificial Intelligence in Education	(E)	2	2	Year 3	
	18	KO1143	Teaching Practice in Mathematics	(E)	3	3	Year 4	
	19	KO1262	Teaching Design and Practice of Mathematics Games	(E)	2	2	Year 4	

Double Major Course Requirements List

Students from other departments pursuing a double major in this department must complete at least 45 credits of departmental courses (including at least 27 credits from the Double Major Course Requirements List for (R) and (E) courses).

Category	No.	Course Name	Credits	Remarks
Double Major Course Requirements List	1	Introduction to Mathematical Education	2	At least 14 credits must be completed from the Double Major (R) and (E) course list.
	2	Calculus (I)	4	
	3	Calculus (II)	4	
	4	Linear Algebra (I)	3	
	5	Linear Algebra (II)	3	
	6	Introduction to Computer	3	
	7	Advanced Calculus (I)	4	
	8	Advanced Calculus (II)	4	
	9	Algebra (I)	3	
	10	Differential Equations	3	

Category	No.	Course Name	Credits	Remarks
	11	Probability Theory	3	
	12	Mathematical Statistics	3	

Minor Course Requirements List

Students from other departments pursuing a minor in this department must complete at least 20 credits of departmental courses (including at least 14 credits from the Minor (R) and (E) Course Requirements List).

Category	No.	Course Name	Credits	Remarks
Minor Course Requirements List	1	Calculus (I)	4	At least 14 credits must be completed from the Minor (R) and (E) course list.
	2	Calculus (II)	4	
	3	Linear Algebra (I)	3	
	4	Linear Algebra (II)	3	
	5	Advanced Calculus (I)	4	
	6	Advanced Calculus (II)	4	
	7	Algebra (I)	3	
	8	Introduction to Mathematical Education	2	
	9	The Psychology of Mathematics Learning	3	