開南大學　96 年度第 2 學期　　財金系、所、中心科目教學計劃表

課程編號	1	2	5	0	M	1	1	7	0		授課教師：　曾國雄、高立箴 老師 老師 e-mail：ghtzeng@mail.knu.edu.tw ljkao@mail.knu.edu.tw 老師分機：1101(曾國雄老師), 5061(高立箴 老師)
班次	01									■ 必修 □ 選修	
開課系所：	財金學系										
年級班別：	1 年　　班										
課程名稱(中文)										學分數	課程名稱(英文)
財務金融研究方法										3	Research method in Finance and Banking

Course Objective: The purpose/objective of this course "**Research Methods for problems-solving**" is to teach the **whole methods** in "**techniques of logic reasoning and thinking systems**" for students to **understand, solve, and treat all possible problems**. Then the students can **promoting** and **expanding** the **competence sets** to enhance the **work ability and skill** for **solving** and **treating all faced problems** in different fields/domains in the employment and life. Therefore, this course is aimed at individual issues/objects by using "**multivariate statistical analysis and data mining**" for data process analysis" to u erstand the existing problems for prospecting the future, then at the understood problems to proceed with "**multi-objective programming**" for plan/design and/or with "**multi-criteria evaluation**" for choose/selection/improvement, propose to solve and analyze the problems in feasible alternatives for finding the "problems-solving".

Course Outlines: When we solve any problems, do any researches, or make any decisions, we must use the numerical data as a basis for data-analysis/data-mining, forecasting, planning, and evaluation. The data can be crisp or exist fuzzy/vagueness or subjectively multidimensional data by natural language/linguistics. Therefore, in this course the data sets are included crisp data sets, fuzzy data sets, rough sets, grey hazy sets and so on for treating and solving problems. The contents are included: (1) statistical & multivariate analysis and data mining (including evolutionary computation) for analyzing the data sets to retrieve the patterns/classifiers and forecasting in treating, finding and solving problems, (2) r tiple objective decision making to plan and design the optimal problems for achieving aspired/desired level, and (3) multiple attribute decision making to evaluate/select and improve the best alternative for reducing the gaps in each attribute to achieve aspired/desired level. Fuzzy theory is included five parts: (1) fuzzy sets, (2) fuzzy numbers, (3) fuzzy relations, (4) fuzzy measures, and fuzzy reasoning (fuzzy inferences).

Contents of Course as follows:

1. Statistical & Multivariate Analysis and Data Mining for data processes

(1) Data processes in statistical and multivariate analysis

This part includes: (a) data collections by using sampling survey based on multi-attribute/ multi-objective sampling design; (b) statistical testing in single- and multivariate; (c) principle component analysis and factor analysis (including quantification III & IV, MDS, including fuzzy theory), AHP (including fuzzy AHP); (d) cluster analysis (including C-means or called K-means, including fuzzy theory), discriminant analysis (including quantification II, Conjoint analysis, Logit model, Probit analysis, ANN discriminant, including fuzzy theory and fuzzy integral); (e) relation model for forecasting, such as multi-regression analysis, fuzzy regression, time series and fuzzy time series (including ARIMA, fuzzy ARIMA, etc.), fuzzy piecewise regression, interval regression by quadratic programming, quantification I, fuzzy quantification I, grey foresting and grey possibility forecasting, Chaos forecasting, Kalman Filtering forecasting, GMDH, Canonical analysis including fuzzy theory.

(2) Evolutionary computation and soft computing for classification and identification/patterns

These new methods are developed by computer advance that is the most revolutionary useful tool in the 20th century. These new methods can relax and improve many assumptions in traditional methods, such as assumed independence, linear, etc. in variables/attributes/criteria (statistical & multivariate) for suiting the real world situations. These methods include such as artificial neural network (ANN), genetic algorithm (GA), genetic programming (GP), genetic network programming (GNP), support vector machine (SVM), rough set theory, etc. for classification and identification/ patterns.

(3) Logic reasoning including fuzzy reasoning and rough set theory for partitions and identification/ patterns.

2. Multiple Objective Decision Making (MODM) for planning and designing the problems

In any situations and in any time or daily activities, persons, business/enterprises, and even to nations are often the face of decision problems to be multi-dimensions of whole consideration for planning and designing the problems to achieve the aspired/desired levels. The contents include vector optimization since 1950s, goal programming since 1955 (Charnes and Cooper), compromise solution since 1970s (Yu and Zeleney), DEA since 1978 (Charnes, Cooper, and Rhodes), multi-stage multi-objective programming, bi-level and multi-level programming (including fuzzy bi-level and multi-level programming), MC^2 programming, fuzzy MC^2 programming, fuzzy multi-objective programming (including fuzzy goal, fuzzy resource, fuzzy parameters, fuzzy variables), De Novo programming, fuzzy De Novo programming, fuzzy DEA, multi-objective DEA, Genetic Algorithms for fuzzy combinatorial multi-objective decision-making, TOPSIS for MODM, habitual domain - fuzzy - dynamic multi-level multi-stage multi-objective programming.

3. Multiple Attribute Decision Making (MADM) for evaluating, selecting, or improving the problems

In any situations and in any time or daily activities, persons, business/enterprises, and even to nations are often the face of decision problems to be multi-dimensions of whole consideration for evaluating, selecting and improving the problems to achieve the aspired/desired levels. The contents include multi-attribute utility theory (including fuzzy), DEMATEL/FCM/ISM for re-structuring the structural relations for weightings (AHP, ANP, or fuzzy integral), Analytic Hierarchy Process (AHP, fuzzy AHP), Analytic Network Process (ANP, fuzzy, ANP), fuzzy integral, grey relation for evaluation, TOPSIS, VIKOR, PROMETHEE I, II, III, IV, ELECTRE I, II, III, IV, habitual domain for dynamic weightings, fuzzy ANN dynamic multi-attribute decision-making, and so on.

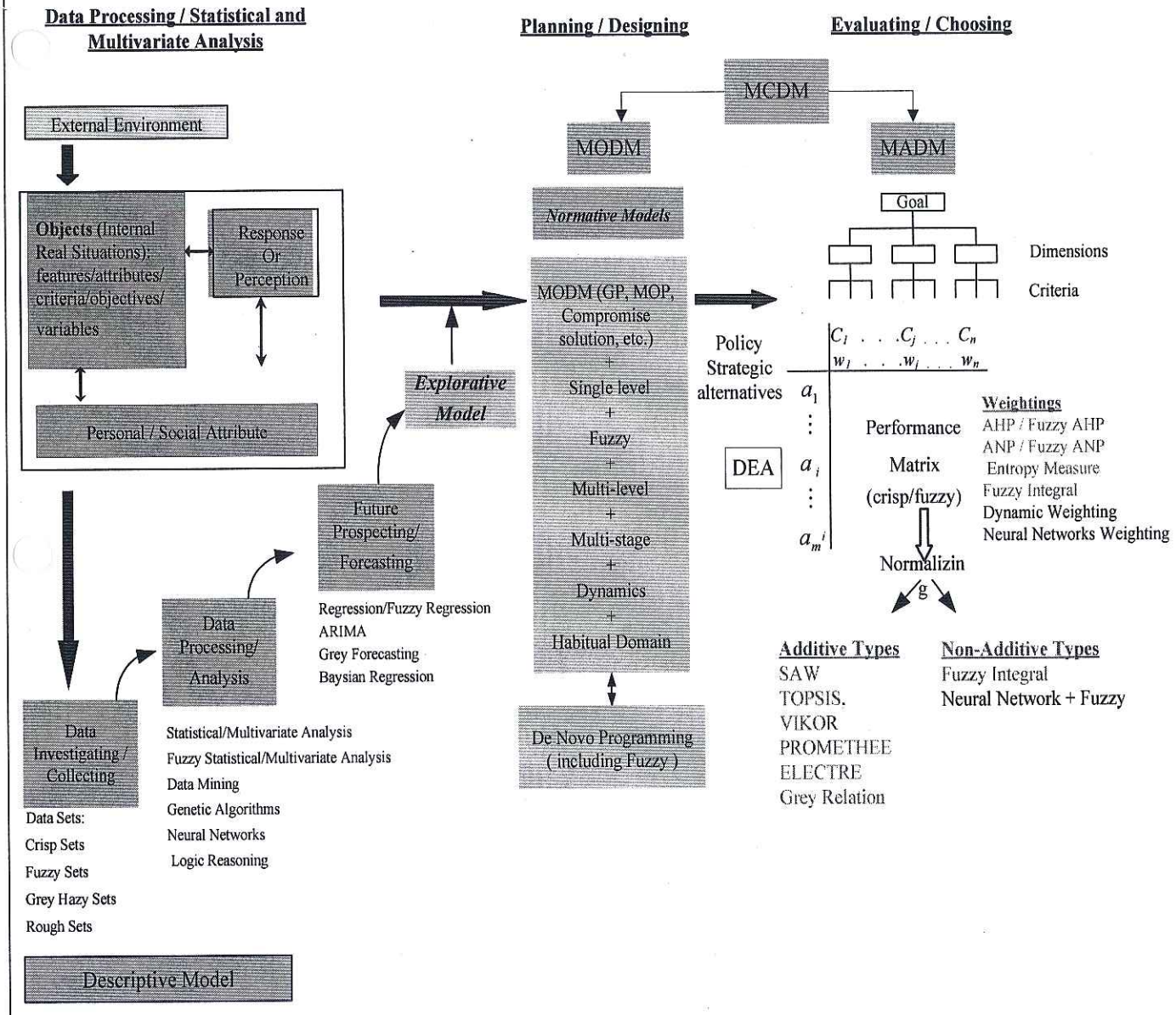

Fig. 1 Concepts of Course Systems in "Research Methods"

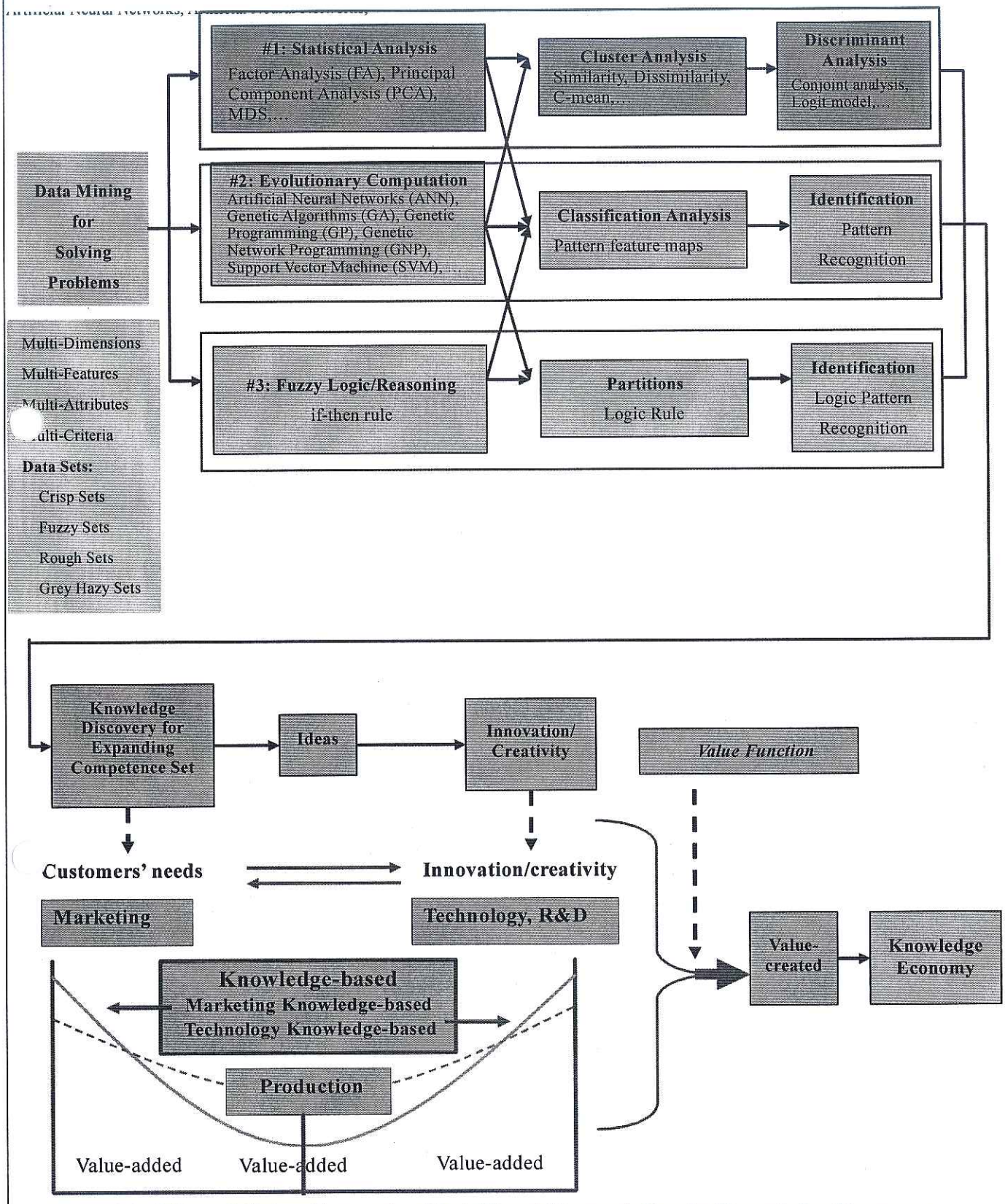

Fig.2 Data Mining Concepts of Intelligent Computation in Knowledge Economy

實施方法	■講解法■實作法□討論法□演習法□問答法□其他_____
評量方式	First Stage: Final examination for testing the concepts of "Research Methods for Problems-Solving and Applications" (50%) - Final examination: Second Stage: "Research Methods" for Problems-Solving and Applications in real cases (50%) Term Paper (submitted date) (50%) - Language: English is better. - Abstract and proposal: - Full paper: - Final Revised Paper:
授課使用及參考書籍	(請按作者、書名、版別、出版商、發行地、出版年份、起訖頁數順序填寫)。
	自行編成之教材，以及期刊發表之論文為主。 參考書籍如下: Tzeng, Gwo-Hshiung and Huang, Jih-Jeng (2007), *New Frontiers of Multiple Objective Decision Making*, Kainan University. Tzeng, Gwo-Hshiung and Huang, Jih-Jeng (2007), *New Frontiers of Multiple Attrative Decision Making*, Kainan University. 曾國雄編著，「統計學問題範例」，鴻儒堂書局，17 頁，民國 70 年。 曾國雄編著 ，「多變量解析應用實例」，民國 69 年，台北市，中興管理顧問，415 頁。 曾國雄編著，「多變量解析與其應用」，民國 67 年，台北市，華泰圖書文物公司，402 頁。 曾國雄編著，「現代統計學」，台北市，鴻儒堂書局，513 頁，1978 年修正。 曾國雄、鄧振源，「多變量分析(一):理論應用篇」，民國 75 年 5 月，松崗電腦圖書公司，491 頁。 曾國雄，個人論文發表文獻。如個人資料(Tzeng's VITA, Journal publications)。 1. 曾國雄等編著，多目標決策分析(I)：多屬性效用之理論與應用講義。 2. 曾國雄等編著，多目標決策分析(II)：多評準決策之理論與應用講義。 3. 曾國雄等編著，多目標決策分析(III)：多目標規劃之理論與應用講義。 4. 中山弘隆、谷野哲三（1994），多目的計劃法之理論與應用，計測字動制御學會。 5. Keeney, Ralph L. and Raiffa, Howard, (1976), *Decision with Multiple Objectives: Preference and Value Tradeoffs*, John Wiley & Sons. 6. Hwang, Ching-Lai and Masud, Abu Syed Md. (1979), *Multiple Objective Decision Making: Methods and Applications*, Springer-Verlag. 7. Saaty, Thomas L. (1980), *The Analytic Hierarchy Process: Planning, Priority Setting, Resource Allocation*, McGraw-Hill, Inc. 8. Hwang, Ching-Lai and Yoon Kwangsum (1981), *Multiple Attribute Decision Making : Methods and Applications*, Springer-Verlag, New York.

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29. Carlsson, C. and Fuller, R. (2002), *Fuzzy Reasoning in Decision Making and Optimization*, Physica-Verlag, Heidelberg.
30. Sakawa, M. (2002), *Genetic Algorithms and Fuzzy Multiobjective Optimization*, Kluwer Academic Publishers, Norwell, MA.

科目簡介(含課程大綱及教學進度)：

對各方法發展緣由、體系、應用及其未來發展之方向加以探討。其中包括三個部分（含「明確集（Crisp Sets）」、「模糊集（Fuzzy Sets）」、「約略集（Rough Sets）」、以及「灰朦集（Grey Hazy Sets）」）：

(1) 多屬性效用之理論與應用：包括多屬性效用理論之發展與展望、二元關係、偏好關係與效用函數、價值函數、成對比較之效用函數、區位評選、都市環境評估模式（多屬性效用之應用）、路線選擇行為之研究（多屬性效用理論之應用）、消費者個體選擇行為模式（Logit 模式、Neural Network Logit 模式、Logic 推論 Logit 模式）以及模糊多屬性效用之理論與應用等。

(2) 多評準決策之理論與應用：包括多評準決策分析之回顧與展望、多評準決策分析方法之體系、層級分析法（AHP）與網路分析法(ANP)的內涵特性與應用、模糊與灰色多評準決策之理論與應用、非加法型模糊積分評估方法之理論與應用等。含 SAW、TOPSIS、VIKOR、ELECTRE、PROMETHEE、Fuzzy Integral (含 Fuzzy Measure) 等。

(3) 多目標規劃之理論與應用：包括多目標規劃方法之發展及其體系、多目標規劃法之基礎理論、多目標決策問題之解法、多目標組合最佳化之基因演算法、多目標最適化之應用、多目標投資計畫方法、多目標投資規劃、De Nov 多目標規劃法、二階與多階之多目標規劃法、多階段之多目標規劃法、多階層多階段之動態多目標規劃法等，並引進模糊多目標規劃方法等之理論與應用等。

Feb. 27 (Wednesday) Over-views	Mar. 5 (Wednesday)	Mar. 12 (Wednesday)
Mar. 19 (Wednesday)	Mar. 26 (Wednesday)	Apr. 2 (Wednesday)
Apr. 9 (Wednesday)	Apr. 16 (Wednesday)	Apr. 23 (Wednesday)
Apr. 30 (Wednesday)	May. 7 (Wednesday)	Submitted abstract and proposal
May. 14 (Wednesday)	May. 21 (Wednesday)	May. 28 (Wednesday)
June. 4 (Wednesday)	June. 11 (Wednesday)	
June. 18 (Wednesday)	Submitted full paper	
June. 25 (Wednesday)		
July. 2 (Wednesday)	Submitted to final revised paper	

說明：

1. 授課教師於學期前填寫本表，經課程委員會審核後，影印分送給教師所屬課程委員會召集人，授課班級所屬系、所及教務處課務組;並於開始上課時，將本內容向學生說明。
2. 本表於 91.4.23 第四次校課程委員會討論通過。

課程委員會召集人：財金系主任何文榮

授課教師：