

課程名稱 (Course Name) : 中文: 萃智系統化創新方法

Course Title: Theory of Inventive Problem Solving

課程編號 (Course ID) : **IEEM 5551**

選修 : 3 學分 (研究所)

Elective: 3 credit hours, graduate standing for students with Engineering/Science background.

任課教師(Instructor) : 許棟樑 D. Daniel Sheu (dsheu@ie.nthu.edu.tw)

一、課程說明 (Descriptions):

TRIZ is the acronym of Russian language, Teoriya Resheniya Izobreatatelskikh Zadatch, Translated roughly in to English as “Theory of Inventive Problem Solving” (TIPS). It was developed by a Russian patent examiner and inventor, Genrich Altshuller, started from 1946. The classical knowledge of TRIZ was originated from the studies of best Patents (200,000 patents extracted to 40,000 best patents). Now the TRIZ theory is extracted from the studies of more than 1 Million patents.

In contrast to Random Innovation methods such as brainstorming, TRIZ is often regarded as the most effective set of Systematic Innovation methods. Unlike random innovation, TRIZ is very methodical and logical. The whole process is systematically using prior wisdom (in patents) to generate innovative ideas. It is regarding breaking people’s psychological inertia enabling them to jump out of box to see things from various space-time-interface thus understanding problems much better and reaching breakthrough ideas for problem solving.

Many world leading companies are

The purpose of this course is to acquaint the students with the TRIZ theory and methods for the purpose of applying them to solve real-world engineering problems. TRIZ is very useful in solving product, process, and equipment problems in addition to creativity training to think out-of-box. Many real-world engineering examples will be used to illustrate the TRIZ methods. Students are required to form teams to work on problem-solving projects. Industrial students are highly encouraged to bring their industrial problems to the class for problem-solving projects. Due to limited time, the class will cover the TRIZ++ level 1 and some level 2 materials.

TRIZ(萃智) 是俄文的縮寫，其意義為「發明性問題解決理論」(Theory of Inventive Problem Solving)。是由蘇俄發明家 Genrich Altshuller 於 1946 年開始，分析研究超過二十萬件專利所提出的理論，及實務的系統性創新方法。主要是系統性地利用前人及跨領域的智慧來解決問題。它可以很有系統地帶領我們跳出思考窠臼、拓展革新思維。其通盤、有效且具系統化之特性可推廣於各種產業。也成為當今產品、製程及服務的創新，最有效、最重要的系統手法。三星(Samsung)、LG、英特爾、西門子、通用電器(GE)等均大力推展萃智，並獲得大量創

新、專利及財務效益。

我國電子業近年常敗於韓國三星等電子公司之手，如 DRAM、LCD 產業在技術、市場等方面都被三星、Hynix 等打得很慘，其主因之一就是『韓國產業大量使用萃智系統化創新而我們仍停留於腦力激盪式的隨機創新』。

本課程的目地在於探討萃智系統性創新思考方法與理論並加以運作到產品、製程或設備上的創新解決問題。本課程除了課堂授課外，使用大量案例演練與檢討，以加強學習效果。並帶領學生把萃智手法，應用於課程專題上，以解決實務問題。**歡迎產業界學生把產業問題帶進來解決問題。**學校全職學生則仍可作生活化的專題。

本課程效益含：

- 學員能習得萃智的知識意涵，在產業實務上將具有深度的分析與解題能力，大幅提升產品、製程、設備等問題的解題能力及有機會產生專利創意的能力。
- 不僅習得萃智創新如何應用於工程實務當中，亦能發揮於生活實用中，產生創新發明的點子。
- 大幅提昇學員創新思維及邏輯能力

二、相關課程

(1)先修課程(Prerequisite): 大學物理, 碩博士 生 Graduate standing taken college physics.

(2)繼續課程(Continuation course): Advanced level of TRIZ. Other Systematic innovation courses.

三、課程內容或大綱(Course Outline): (54 學時內容, 可依時間酌量調整)

1. 課程概觀; 系統化與萃智創新 知識體系概觀 (Overview of TRIZ body of knowledge)
2. 萃智在創新價值鏈之定位 (TRIZ position in the Innovation Value Chain)
3. 專題運作模式與工具表格說明 (Project operational process and explanation of the Project Forms)
4. 功能/屬性分析 (Function-Attribute Analysis)
5. 因果矛盾鏈分析 (Cause-Effect-Contradiction Chain Analysis)
6. 矛盾矩陣與 40 發明法則 (Contradiction Matrix and 40 inventive principles)
7. 物理矛盾解法 (Solving Physical Contradictions)
8. 功能導向搜尋與科技知識庫使用 (Function orient search & Effect Database)
9. 裝置削剪 (Device Trimming)
10. 物場分析與標準解 (Su-field analysis and Standard solutions)
11. 專題製作與檢討 (Review and facilitation of practical problem-solving projects)

四、教本及參考資料 (Textbooks and references)

教本 (Text): (Either 1. or 2. Plus 3)

1. 許棟樑, (2015/9). “萃智創新工具精通: 上冊”, 亞卓國際顧問股份有限公司. 四版, ISBN 978-986-85795-2-1.

Sheu, D. Daniel, “Mastering TRIZ Innovation Tools: Vol. 1”, 4th Ed., Agitek International Consulting Inc., ISBN 978-986-85795-2-1.

2. Class notes (上課講義)

參考資料 (References):

3. 許棟樑, “萃智創新工具精通: 中冊”, 亞卓國際顧問股份有限公司, 2013/12, ISBN: 978-986-85795-6-9.
4. Hands-on Systematic Innovation, Darrel Mann, IFR Press, ISBN 90-77071-02-4, 2007, 2nd Ed.
5. Innovation on Demand: New Product Development Using TRIZ, by Victor Fey & Eugene Rivin, Cambridge University Press, 2005. (www.cambridge.org)
6. 【萃智系統性創新上手】, Darrell Mann 著, 許棟樑 編譯, 亞卓國際顧問股份有限公司 出版.
7. 40 Principles Extended Edition: TRIZ Keys to Innovation, by Genrich Altshuller, 2005 ed., Technical Innovation Center, Inc.
8. And Suddenly the Inventor Appeared: TRIZ, the Theory of Inventive Problem Solving, by G. Altshuller (Author), H. Altov (Author), Lev Shulyak (Translator)

評分標準(Grading Policy):

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| ● Class reviews / participation | 25% |
| ● Homework reports | 20% |
| ● Final Project oral report | 20% |
| ● Final project paper | 20% |
| ● Class findings/summarization | 15% |