工程研究的科學信息收集和處理
SCIENTIFIC INFORMATION GATHERING AND PROCESSING FOR ENGINEERING RESEARCH

基本素養 Basic Literacy

■ 專業倫理與人文素養
Demonstrated professional ethical and humanitarian behaviour.

■ 誠信負責與務實素養
Developed sense of professional integrity.

☐ 永續環境與社會關懷
Developed sense of environmental sustainability and social responsibility.

☐ 多元文化與國際視野
Developed multicultural and international perspective.

核心能力 Competence

■ 機械工程之專業知識
Developed mechanical engineering skills and knowledge.

■ 規劃與執行專題研究之能力
Ability to plan and execute research projects.

■ 專業論文與報告之撰寫和表達能力
Ability to write professional reports / papers and prepare presentations.

■ 創新思考與獨立研究之能力
Ability to perform independent research and demonstrate innovative thinking.

■ 解決問題與協調整合之能力
Ability to solve problems in a coordinated and integrated manner.

■ 前瞻宏觀的國際視野
Developed international and "forward thinking" perspective.

■ 領導、管理及組織團體之能力
Ability to organize, manage and act in a position of leadership.

☐ 自我成長之能力(人文素養與服務精神、專業倫理與終身學習)
Developed sense of "self improvement" (with regard to professional ethics, social responsibility and lifelong learning).

課程概述 Course Description

This course will make you a better researcher. After the course you know how to search for scientific information systematically, e.g. in Scopus and Web of Science. You will have experience writing a technical report, working in a team, using scrum project management, and writing open source software in Python or Javascript. You will know how to automate information extraction and processing. You will know how to apply some machine learning algorithm.

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課程學習目標 Course Objectives

- Be able to search for scientific information systematically
- Have experience extracting information from some reference database platforms
- Be able to analyse and select scientific articles for a specific question
- Write a summary of an article with relation to a specific question
- Write a technical report
- Be able to use scrum for project management
- Have experience using Git for version control and writing in Latex
- Judge if the criteria of a task have been met
- Give a progress report orally

開課系所 Department/Institute: 機械所 Mechanical Engineering
開課教師 Instructor: 吳馬丁 Nordling, Torbjoern
開課學年 Academic Year: 0104
開課學期 Semester: 2
開課序號 Serial Number: 065
課程屬性碼 Attribute Code: ME 7128
課程碼 Course Number: N181200
分班碼 Class Code:
學分數 No. of Credits: 3
課程語言 Medium of Instruction: 英文

課程網址 Course Website:
www.nordlinglab.org/ScientificInformation
先修課程或先備能力 Prerequisite Course(s):
Programming (if you know, e.g. C, Java, Python, or Fortran you will be fine).
Any course on the following topics will be beneficial but is not required: Machine learning, Artificial Intelligence, Natural Language Processing, Data mining, Pattern recognition. Unix user experience is also beneficial.

教師聯絡資訊 Contact with Teacher

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Web: www.nordlinglab.org

助教資訊 Contact with Tutor

學習規範 Course Policy

This course is building on the pedagogics of collaborative learning, project based learning, and problem based learning. Every student is assigned to a group that is given an open-ended problem that the group members together solve and implement as open-source software.
Attendance 60% (counted based on lecture attendance, percentage of committed code lines to the software and report)
Individual oral presentation 10% (each student must present the groups progress once)
Individual written report 20% (each student is responsible for a section in the technical report)
Quizzes 10%

- Implement an algorithm in Python or Javascript
- Be able to explain the current state of the art of information retrieval
- Be able to outline a system for automated information processing
- Be able to explain how to apply some machine learning algorithm

課程進度 Course Outline

週次 Week	進度說明 Progress Description
1	Introduction, assignment of teams, creation of backlog, 1st sprint planning on information retrieval
2	Quiz on information retrieval, 1st sprint review and retrospective, 2nd sprint planning on information processing
3	1st oral presentation on literature findings, 2nd sprint review and retrospective, 3rd sprint planning for writing introduction and theory
4	Quiz on scrum, work session
5	Quiz on Latex and Git, work session
6	2nd oral presentation of introduction and theory sections, 3rd sprint review and retrospective, 4th sprint planning for basic program
7	Work session
8	Quiz on Python or Javascript, work session
9	3rd oral presentation of basic program, 4th sprint review and retrospective, 5th sprint planning for implementation of basic functionality
10	Work session
11	Work session
12	4th oral presentation of implemented functionality, 5th sprint review and retrospective, 6th sprint planning for implementation of advanced functionality
13	Work session
14	Work session
15	5th oral presentation of implemented functionality, 6th sprint review and retrospective, 7th sprint planning for report writting
16	Work session
17	Work session
18	6th oral presentation of the report and demonstration of the software, 7th sprint review and retrospective

以上每週進度教師可依上課情況做適度調整。The schedule may be subject to change.

有關課程其他調查 Other Surveys of Courses

1.本課程是否規劃業界教師參與教學或演講? 否
　 Is there any industry specialist invited in this course? How many times? No
2.本課程是否規劃內含校外實習 (並非參訪)? 否
　 Is there any in (out of) school practicum involved in this course? How many hours? No

評量方式 Grading

方法	百分比%
出席 Participation	60
個人口頭報告 Presentations	10
個人書面報告 Projects	20
平時測驗 Quizzes	10

教學方法 Teaching Strategies

方法	百分比%
講授 Lecture	100

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課程教材 Course Material

Selected scientific articles.

參考書目 References

1. Provost and Fawcett (2013) Data Science for Business, ISBN 9781449361327
2. Larose (2006) Data mining methods and models, ISBN 139780471666561
3. Gross, J. L. & Yellen, J. Graph theory and its applications. (CRC Press, 1999).
4. Albert, R. & Barabási, A.-L. Statistical mechanics of complex networks. Rev. Mod. Phys. 74, 47–97 (2002).
5. Attwood, T. K. et al. Calling International Rescue: knowledge lost in literature and data landslide! Biochem. J. 424, 317–333 (2009).
6. Sanderson, M. & Croft, W. B. The History of Information Retrieval Research. Proc. IEEE. 100, Special Centennial Issue, 1444–1451, (2012).
7. Schwaber, K. & Sutherland, J. The Scrum Guide. (2013).

備註 Remarks

This course will both make you a better researcher and prepare you for industrial teamwork. Students from all departments of NCKU are encouraged to participate, because the skills that you will learn are applicable in all fields of science. If you take this course during your first year in graduate school or your last year as an undergraduate student, then you will have the largest benefit from it.