# Tamkang University Academic Year 104, 1st Semester Course Syllabus

| Course Title | FORMAL LANGUAGES & AUTOMATA THEORY | Instructor | YEN SHWU-HUEY |
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| Course Class | TEIXM1A<br>MASTER'S PROGRAM, DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION ENGINEERING, 1A | Details | ◆ Selective<br>◆ One Semester<br>◆ 3 Credits |

### Departmental Aim of Education

Ⅰ. Cultivate the ability to conduct independent research and problem solving.

Ⅱ. Strengthen creativity and research capacity.

Ⅲ. Build profound professional knowledge in computer science and information engineering.

Ⅳ. Engage in self-directed lifelong learning.

### Departmental core competences

A. Independent problem solving ability.

B. Independent innovative thinking ability.

C. Research paper writing and presentation ability.

D. Research&development (R&D) ability in information engineering.

E. Project execution and control ability.

F. Lifelong self-directed learning ability.

| Course Introduction | The mathematical model of modern digital computer is studied. The purpose is to familiarize students with the foundations and principles of computer science, to teach material that is useful in subsequent courses, and to strengthen students' ability to carry out formal and rigorous mathematical arguments. |
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# The Relevance among Teaching Objectives, Objective Levels and Departmental core competences

I.Objective Levels (select applicable ones) :
  (i) Cognitive Domain    : C1-Remembering,    C2-Understanding,    C3-Applying,
                                 C4-Analyzing,      C5-Evaluating,       C6-Creating
  (ii) Psychomotor Domain : P1-Imitation,      P2-Mechanism,       P3-Independent Operation,
                                 P4-Linked Operation, P5-Automation,     P6-Origination
  (iii) Affective Domain  : A1-Receiving,       A2-Responding,      A3-Valuing,
                                   A4-Organizing,    A5-Charaterizing,  A6-Implementing

II.The Relevance among Teaching Objectives, Objective Levels and Departmental core competences :
  (i) Determine the objective level(s) in any one of the three learning domains (cognitive, psychomotor, and affective) corresponding to the teaching objective. Each objective should correspond to the objective level(s) of ONLY ONE of the three domains.
  (ii) If more than one objective levels are applicable for each learning domain, select the highest one only. (For example, if the objective levels for Cognitive Domain include C3,C5,and C6, select C6 only and fill it in the boxes below. The same rule applies to Psychomotor Domain and Affective Domain.)
  (iii) Determine the Departmental core competences that correspond to each teaching objective. Each objective may correspond to one or more Departmental core competences at a time. (For example, if one objective corresponds to three Departmental core competences: A,AD, and BEF, list all of the three in the box.)

| No. | Teaching Objectives | Relevance | |
| --- | --- | --- | --- |
| | | Objective Levels | Departmental core competences |
| 1 | Understand the finite automata | C4 | AB |
| 2 | Understand the regular languages | C4 | AB |
| 3 | Understand the context free languages | C4 | AB |
| 4 | Understand the pushdown automata | C4 | AB |
| 5 | Enhance students' ability to read/understand technical English | C5 | ABDF |

## Teaching Objectives, Teaching Methods and Assessment

| No. | Teaching Objectives | Teaching Methods | Assessment |
| --- | --- | --- | --- |
| 1 | Understand the finite automata | Lecture, Discussion | Written test, Participation, homework |
| 2 | Understand the regular languages | Lecture, Discussion | Written test, Participation, homework |
| 3 | Understand the context free languages | Lecture, Discussion | Written test, Participation, homework |
| 4 | Understand the pushdown automata | Lecture, Discussion | Written test, Participation, homework |
| 5 | Enhance students' ability to read/understand technical English | Lecture, Discussion | Written test, Participation |
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| This course has been designed to cultivate the following essential qualities in TKU students | |
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| Essential Qualities of TKU Students | Description |
| ◆ A global perspective | Helping students develop a broader perspective from which to understand international affairs and global development. |
| ◆ Information literacy | Becoming adept at using information technology and learning the proper way to process information. |
| ◇ A vision for the future | Understanding self-growth, social change, and technological development so as to gain the skills necessary to bring about one's future vision. |
| ◇ Moral integrity | Learning how to interact with others, practicing empathy and caring for others, and constructing moral principles with which to solve ethical problems. |
| ◆ Independent thinking | Encouraging students to keenly observe and seek out the source of their problems, and to think logically and critically. |
| ◇ A cheerful attitude and healthy lifestyle | Raising an awareness of the fine balance between one's body and soul and the environment; helping students live a meaningful life. |
| ◆ A spirit of teamwork and dedication | Improving one's ability to communicate and cooperate so as to integrate resources, collaborate with others, and solve problems. |
| ◇ A sense of aesthetic appreciation | Equipping students with the ability to sense and appreciate aesthetic beauty, to express themselves clearly, and to enjoy the creative process. |

## Course Schedule

| Week | Date | Subject/Topics | Note |
|---|---|---|---|
| 1 | 104/09/14 ~ 104/09/20 | Introduction and Mathematical Background Review | Possible to be the on-line class (video) |
| 2 | 104/09/21 ~ 104/09/27 | DFA | |
| 3 | 104/09/28 ~ 104/10/04 | NFA | |
| 4 | 104/10/05 ~ 104/10/11 | Regular Languages | Possible to be the on-line class (video) |
| 5 | 104/10/12 ~ 104/10/18 | Regular Grammars | |
| 6 | 104/10/19 ~ 104/10/25 | Equivalence between different forms of Regular languages | |
| 7 | 104/10/26 ~ 104/11/01 | Properties of Regular Languages | Possible to be the on-line class (video) |
| 8 | 104/11/02 ~ 104/11/08 | Pumping Lemma | |
| 9 | 104/11/09 ~ 104/11/15 | Review | |
| 10 | 104/11/16 ~ 104/11/22 | Midterm Week | |
| 11 | 104/11/23 ~ 104/11/29 | Context free Grammar | Possible to be the on-line class (video) |

| 12 | 104/11/30~104/12/06 | Parsing and Ambiguity | |
|---|---|---|---|
| 13 | 104/12/07~104/12/13 | Chomsky NF & Greibach NF | |
| 14 | 104/12/14~104/12/20 | Pushdown Automata | Possible to be the on-line class (video) |
| 15 | 104/12/21~104/12/27 | Pushdown Automata & CFG | |
| 16 | 104/12/28~105/01/03 | Properties of CFL | |
| 17 | 105/01/04~105/01/10 | Review | |
| 18 | 105/01/11~105/01/17 | Final Exam Week | |

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| Requirement | It is possible to have several on-line classes. The dates are not sure yet. Please pay attention to the announcement in the class. |
| Teaching Facility | Projector |
| Textbook(s) | An Introduction to Formal Languages and Automata ( 7th ed, by Linz) |
| Reference(s) | |
| Number of Assignment(s) | 3    (Filled in by assignment instructor only) |
| Grading Policy | ◆ Attendance： 5.0 %  ◆ Mark of Usual：20.0 %  ◆ Midterm Exam： 30.0 %<br>◆ Final Exam： 30.0 %<br>◆ Other〈Homework〉：15.0 % |
| Note | This syllabus may be uploaded at the website of Course Syllabus Management System at http://info.ais.tku.edu.tw/csp or through the link of Course Syllabus Upload posted on the home page of TKU Office of Academic Affairs at http://www.acad.tku.edu.tw/CS/main.php .<br>**※ Unauthorized photocopying is illegal. Using original textbooks is advised. It is a crime to improperly photocopy others' publications.** |