**COLLEGE OF ENGINEERING, TECHNOLOGY, AND COMPUTER SCIENCE**

**DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING**

**TENNESSEE STATE UNIVERSITY**

**COURSE DESCRIPTION FOR COMP3560 Introduction to the Theory of Computing**

SEMESTER: Spring 2012 PROFESSOR: Dr. Wei Chen

**A. CATALOG COURSE DESCRIPTION**

This course presents various models of computation and the relationships between these models and various classes of languages. Topics include: finite automata, regular languages, context-free languages, Turing machines, complexity and limits of algorithmic computation, new computation paradigms. These topics are used as a basis for exploring computability, complexity, and more advanced areas of theory. Prerequisite: COMP 3200.

**B. COURSE OBJECTIVES**

* + - 1. Introduce students to the foundation of computing (PEO#1).
      2. Provide students the knowledge of computation models and their languages (PEO#1).
      3. Apply the knowledge of computation models, classes of languages, limitation of silicon computers, and new computation paradigms to the control and computing system design (PEO#2 & PEO#3).

**C. PREREQUISITIES**

Students should have a grade of ‘C’ or better in all prerequisite courses. Those who do not meet the prerequisite must withdraw from this course. No grade will be assigned for those students who do not withdraw from the course.

**D. LEARNING OUTCOMES**

Upon completion of this course with a “C” or better, the student should be:

1. Ability to judge whether the given language, grammar and automata match with each other. (a,b)
2. Ability to design and implement a NFA and DFA for simple control applications (a, b, c, j).
3. Ability to design regular grammar and regular language for a given NFA or DFA (a, b).
4. Ability to design a context-free grammar for a simple context free language (a, b).
5. Ability to design a Turing Machine as an accepter or as a transducer (a, b).
6. Knowledge of new computation models (h).
7. Understanding the computation limitation of a silicon computer and new computation models (a, b, h).
8. Ability to work in teams on course projects (d).

**E. DETAILED COURSE OUTLINE: COMP3560**

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| --- | --- | --- | --- | --- |
| Date | Lecture# | Chapter # | Topics | Assignment/Due |
| 1/12 | 1 | Chapter 1  Introduction | Course Introduction, and syllabus |  |
| 1/17 | 2 |  | Review of mathematics foundations |  |
| 1/19 | 3 |  | Languages |  |
| 1/24 | 4 |  | Σ\*, Grammars | A#1 |
| 1/26 | 5 |  | Chapter 1 Review |  |
| 1/31 | 6 | Chapter 2  Finite automata | Deterministic Finite Automata | Due A#1 |
| 2/2 | 7 |  | Transition Graphs |  |
| 2/7 | 8 |  | Use of DFA in Languages (Acceptors) | A#2 |
| 2/9 | 9 |  | Regular Languages, Examples |  |
| 2/14 | 10 |  | Non-Deterministic FA | Due A#2 |
| 2/16 | 11 |  | Chapter 2 Review |  |
| 2/21 | 12 |  | Test #1 |  |
| 2/23 | 13 | Chapter 3  Regular expressions & regular languages | Regular Expressions, Regular Languages |  |
| 2/28 | 14 |  | Regular Grammars | A#3 |
| 3/1 | 15 |  | Properties of Regular Languages |  |
| 3/13 | 16 |  | Chapter 3 Review | Due A#3 |
| 3/15 | 17 | Chapter 5  Context-free languages | Context-Free Languages |  |
| 3/20 | 18 |  | Context-Free Grammars, Examples of Sentential Forms |  |
| 3/22 | 19 |  | Parsing, Context-Free Grammars and Programming Languages | A#4 |
| 3/27 | 20 |  | Methods for Transforming Grammars, Important Normal Forms | Due A#4 |
| 3/29 | 21 |  | Test #2 |  |
| 4/3 | 22 | Chapter 9  Turing Machine | Turing Machines: Definition |  |
| 4/5 | 23 |  | Turing Machines as Language Acceptors | A#5 |
| 4/10 | 24 |  | Turing Machines as Language Transducers |  |
| 4/12 | 25 |  | Design of Turing Machines |  |
| 4/17 | 26 | Chapter 12  Limits of algorithmic computation | Computability and decidability, Turing machine halting problem | Due A#5 |
| 4/19 | 27 | Chapter 14  Computational complexity | Class P, NP and NP-completeness |  |
| 4/24 | 28 | Special topics | New computational models |  |
| 4/26 | 29 |  | Course review and wrap up |  |
|  |  |  | FINAL EXAM |  |

**F.** **GENERAL INFORMATION**

1. **Number of Credit Hours:** 3

2. **Text book:**

Title: An Introduction to Formal Languages and Automata.

Authors: Peter Linze

Publisher: Jones and Bartlett Computer Science

3. **Class Days & Time:** MW 11:20am-12:45pm

4**. Instructor Information**

Office: MH Room 5N

Office hours: **TR** 11:05 am – 11:20 am, 12:45 pm –13:00 pm, 14:30 pm – 15:30 pm

**MW** 9:00am – 10:00am, 11:30am – 13:00pm

**F 10**:20 am – 10:20am, 11:05 am – 12: 45 pm

Phone number: 963-5878

Email: [wchen@tnstate.edu](mailto:wchen@tnstate.edu) URL: <http://www.tnstate.edu/faculty/wchen>

**G. CLASS ATTENDENCE**

Class attendance is required. The university’s policy on excessive absences will be followed. All students are requested to review more than four classes will be dropped from the class. Students are responsible for all assignments, announcements, and materials presented during the class.

**H. EVALUATION AND GRADING**

There will be two scores for two written pre-final tests, a score for homework assignments, a score for quizzes, a score for course project, and one score for the final test. Weights (percentages) for different scores will be as follows.

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|  |  | **Grading:** |  |
| **Assignments** | 30% | 90-100% | A |
| **Quizzes** | 10% | 80-89% | B |
| **Project** | 10% | 70-79% | C |
| **Test 1** | 15% | 60-69% | D |
| **Test 2** | 15% | Below 60% | F |
| **Final test** | 20% |  |  |

**I**. **IMPORTANT NOTES:**

1. Textbook is an essential part of the course and therefore, every student must buy and read the textbook. Some of the homework assignments will be selected from the textbook.
2. Every student has to preview the lecture note and bring it coming to the class (the lecture notes can be download from [www.tnstate.edu/wchen](http://www.tnstate.edu/wchen)).
3. Class roll will be taken at the beginning of the class period. The students that come after the process of taking roll is over will be recorded as absent.
4. Excuses regarding missed classes such as a doctor’s appointment or death in the family must show evidence such as a doctor’s excuse or obituary as soon as possible before or after the incident. If the absence is anticipated, such as a job interview, the student must notify the instructor in advance.
5. Cellular Phones must be turned off during the class period.
6. POLICY ON EXCESSIVE ABSENCES: The Policy on Excessive Absences as printed in the Undergraduate Catalog will be followed. Student missing more than three (3) lectures or being too late may be dropped from the class without prior notice.
7. An ample number of homework assignments will be given. Correct answers and explanation of the assignments will be given after the due days. Therefore, all assignments are due on, or before, the due date and time. Assignments will not be accepted at all after the due date & time; not even with an official excuse.
8. Homework assignments can be worked out individually or collectively in small groups. However, copying other students’ work is absolutely prohibited.
9. Written assignments must be submitted in readable and clean forms. NO CREDIT will be given for a non-readable work.
10. No test will be repeated for students who miss tests, no matter what is the reason. However, if a student misses a test for a reason accepted and certified, then score of the following test will be recorded for the score of the missing test.
11. Any student found cheating on any test or assignment will automatically receive a grade of 0 (F) for the course.
12. No grade of I (Incomplete) will be given, unless the university policy admits it.
13. Instructor reserves the right to modify the score weights.