A. Protocol

Course Name: Language Translation
Course Number: CSC460
Credits: 3
Prerequisites: Co-Requisite CSC 475 Theory of Languages

Maximum Class Size (face-to-face): 35
Maximum Class Size (online): N.A.

B. Objectives of the Course:
Upon completion of this course the student will be able to:

1) Identify the phases of a compiler.
2) Design a data structure to store tokens.
3) Discuss the creation of symbol tables.
4) Discuss error analysis of computer programs.
5) Distinguish between lexical and syntactic errors.
6) Write transition diagrams recognizing tokens.
7) Specify tokens using regular expressions.
8) Design a Lexical Analyzer using transition diagrams.
9) Use syntax definition to analyze programs and statements.
10) Use translation of postfix notation to analyze perform code generation of assignment statements.
11) Discuss top down, recursive descent, and predictive parsing.
12) Use predictive parsing to perform syntax analysis of control statements.
13) Discuss the theory of grammars.
14) Discuss syntax directed translation of control statements.
15) Write programs performing Lexical Analysis, Syntactic Analysis, and Code Generation of high level programming languages.

C. Catalog Description:
This course studies the design and construction of compilers. Lexical analysis, syntactic analysis, and code generation are investigated in detail. Language design, interpreters, semantic analysis, intermediate code generation, and code optimization are also considered. Prerequisite: Co-Requisite CSC 475 Theory of Languages. Three credits.

D. Outline of the Course:
1) Overview of compiling
   a. The phases of a compiler
   b. The lexical analyzer
   c. The syntactic analyzer
   d. The code generator
   e. Error analysis
   f. Example class language to be compiled
2) Lexical analysis
   a. The role of the lexical analyzer
      i. Generation of a stream of tokens
      ii. Creation of the symbol table
      iii. Lexical error analysis
   b. Specification of tokens using regular expressions
c. Recognition of tokens using transition diagrams or finite automata

3) Syntax analysis
   a. Syntax definition through grammars and parsing trees
   b. Syntax analysis of assignment statements
      i. Types of errors
      ii. Postfix notation
      iii. The jump table algorithm
   c. Syntax analysis of control statements
      i. Top down parsing
      ii. Recursive descent parsing
      iii. Predictive parsing
      iv. Other parsing techniques
   d. Introduction to the theory of grammars

4) Code generation
   a. Syntax-directed translation
   b. Translation schemes and applications to assignment statements
   c. Translation of control statements

5) Other possible topics
   a. Interpreters
   b. Semantic analysis
   c. Intermediate code generation
   d. Code optimization
   e. Compiler generators

E. Teaching Methodology:

1) Traditional Classroom Methodology:
   This course will be taught using the lecture/discussion method and cooperative group method during appropriate sections of the course.

2) Online Methodology:
   This course will not be taught online.

F. Text:
   Fischer & LeBlanc Crafting a Compiler with C ISBN 0805321667

G. Assessment Activities:

1) Traditional Classroom Assessment
   The final grade will be determined as a percentage from the following evaluation methods with varying weights at the discretion of the instructor:
   a. Examinations
   b. Quizzes
   c. Assignments
   d. Programs
   e. Attendance
   f. Performance

2) Online Assessment
   No online assessments will be given.
H. Accommodations for Students with Disabilities:

*Accommodations for Students with Disabilities*

Students with disabilities:
- Reserve the right to decide when to self-identify and when to request accommodations.
- Will register with the Office for Students with Disabilities (OSD) each semester to receive accommodations.
- Might be required to communicate with faculty for accommodations, which specifically involve the faculty.
- Will present the OSD Accommodation Approval Notice to faculty when requesting accommodations that involve the faculty.

Requests for approval for reasonable accommodations should be directed to the Office for Students with Disabilities (OSD). Approved accommodations will be recorded on the OSD Accommodation Approval notice and provided to the student. Students are expected to adhere to OSD procedures for self-identifying, providing documentation and requesting accommodations in a timely manner.

Contact Information:

- Location: Azorsky Hall – Room 105
- Phone: (724) 938-5781
- Fax: (724) 938-4599
- Email: osdmail@calu.edu
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