Title: Application Development

Catalog Description

The purpose of this course is to introduce the students to the fundamental concepts and models of application development so that they can understand the key processes related to building functioning applications and appreciate the complexity of application development. Students will learn the basic concepts of program design, data structures, programming, problem solving, programming logic, and fundamental design techniques for event-driven programs. Program development will incorporate the program development life cycle: gathering requirements, designing a solution, implementing a solution in a programming language, and testing the completed application.

Learning Objectives

Students will be able to:

- Understand fundamental programming concepts
- Understand the complexity of development of functioning applications
- Understand the key elements of a program development lifecycle
- Understand core program control structures
- Choose and implement correct control structures for simple algorithms
- Understand fundamental data structures
- Choose and implement correct data structures for simple algorithms
- Model simple structured problems algorithmically
- Use a programming language to implement, test, and debug algorithms for solving simple problems
- Create simple programs that relate to a specific domain
- Test programs with sample data

Topics

- Program design
- Program development lifecycle
- Program requirements determination, analysis, and specification
- Modular design
- Flowcharts
- Programming concepts
    - Variables
    - Literals
    - Types
    - Expressions
    - Procedures
    - Functions
    - Parameters
    - Operators and operations
    - Decision logic
    - Looping

    - Passing parameters
- Coding
- Unit testing
- Control structures
    - Sequential
    - Conditional
    - Iterative
- Input/Output (I/O) design
    - Text-based
    - Graphical user interface (GUI)
- Data structures
    - Primitive data types, composite data types, arrays
    - Memory management
    - Sequential and random file processing
- Database access
- Development approaches
    - Object-oriented
    - Procedural
    - Declarative
    - Rapid application
    - Structured
- Application integration
- Prototyping
- Overview and history of programming languages

Discussion

- The course benefits from computer lab resources either in class or available for licensing on individual students' computers. The choice of language should reflect commonly used languages and tools with the expectation that learning any language will generalize to other languages. For this reason it may be best to concentrate on one language to develop depth rather than breadth across several languages.

