The Process of Program Development

• The purpose of learning this process is to:
  – Familiarize your self with the knowledge and habits of solving problems with software
  – Indoctrinate ones self with how to implement a designed solution
Keys to Computer Science Success

● Upfront planning which includes analysis and design are critical

● Management of your time allotted to the analysis, design and implementation of a solution is crucial

● Successful problem solving and programming requires extreme precision and attention to detail
Keys to CS Success

- Implementation of a solution or developing a program requires
  - Developing an overall structure
  - Composing the structure into interacting collaborative sub-components
  - Definition of each sub-component in terms of high level statements
Keys to CS Success

• The 6 steps of successful program development
  – Analyze the problem
    • Must know exactly what you are to accomplish with your solution
    • Must understand all the data and assumptions required for the solution
  – Design and further develop the algorithm
  – Implement the algorithm
Keys to CS Success (Cont.)

- Execute the program
- Test results to verify correctness
- Document the program
Top Down Design

- Design methodology utilized to
  - State the problem as precisely and as detailed as possible
  - Sub-divide main tasks into major sub-tasks
  - Further divide each sub-task into smaller more concise sub-tasks

- This methodology employs the use of Stepwise Refinement

- Stepwise refinement is simply the process of continually subdividing a task
Top Down Design (Cont.)

- Artifacts of Top Down Design
  - Collection of modules which are the independent units that are sub-components of a larger task
  - Modules are typically implemented in a programming language as either a function or procedure
  - Structure charts which are a graphical representation tool utilized to capture the modules resulting from stepwise refinement
  - Module specification is a formal description that contains and defines the following module attributes
Top Down Design (Cont.)

- Module specification is a formal description that contains and defines the following module attributes
  - Data received (i.e. Input data)
  - Information returned (i.e. Output data)
  - Logic utilized within the module
Top Down Design (Cont.)

- Additional module attribute values that facilitate verification of program correctness
- Module assertions which are
  - Pre-conditions
  - Post-conditions
  - Invariant
Software Engineering

- Process of developing and maintaining very large software systems
  - Useful in software team development
  - Primary issues addressed are:
    - Communication
    - Management
    - Coordination
    - Design in the large
SW LifeCycle

• Concerned with the processes around development, maintenance, and end of life (EOL) of software

• The specific general consist of:
  – Analysis
  – Design
  – Coding
  – Testing/Verification
  – Maintenance
  – Obsolescence