CSE104 L: Computer Programming Laboratory

Programme: B.Tech. (CSE, CCE, ECE, MME)   **Year:** First   **Semester:** First
Course: Institute Core   **Credits:** 2   **Hours:** 40

Course Context and Overview (100 words):

Computer programming is the fundamental course for all branches of engineering. This course is designed to cater for students with diverse backgrounds including those who have little or no prior experiences with computer programming. This training program is directed toward developing programming skills. The objective of the course is to enable students to have hands-on practice and experiences about the basics of computer programming and solving programming problems. Programming language C and related skills is the prime focus of this course. (See: Classroom.google.com code: 06e6n)

The laboratory sessions are organised to support each individual student to learn and progress consistent with their backgrounds and interests. The laboratory course does not impose a class-wide target or weekly schedule of the topics.

Teaching arrangements: Lab session: One 3-hrs session each week as assigned

Prerequisites Courses: Co-enrolment in CSE104.

Course Outcomes (COs):

On completion of this course, the students will have the ability to:
CO1: Understand the basic concepts of computers and programming.
CO2: Design solutions for computational problems and develop programs using programming constructs, control structures, functions and structures based on basic problem solving paradigms.
CO3: Learn and demonstrate ability to design, write, run and trouble-shoot simple programs in an interpreted language.
CO4: Learn and demonstrate ability to design, write, run and trouble-shoot interesting programs in programming language C.

Course Topics

Contents	Typical number of lab sessions
UNIT–1 Basic Programming using an Interpreting Programming Environment (Python/IDLE) Literals, Variables and primitive data types (e.g., numbers, characters, Booleans), Expressions and assignments, Basic input and output handling. Branching Control constructs (if-else, Nested If-else), Iterative constructs (looping)	2
UNIT–2 Core Concepts for Computational Platforms UNIX OS commands and text-editors for constructing, compiling and running programs.	1
UNIT-3 Single function C programs Writing simple C programs within function `main()` using basic types and flow-control constructs. Topics include: variable declarations for basic types, single-dimension arrays, assignment statements, arithmetic expressions, if-statements, switch-statements, for-loops, while-loops. Also introduce: Overview of C standard libraries, input-output using `printf()` and `scanf()`, short-circuit evaluation of Boolean expressions, single-dimension arrays.	2
UNIT-4 Modular Programming Approach Functions: prototype, definition, parameter passing – by value and by reference. Variables: Scope, Lifetime, storage class for variables. Recursion. Sorting and searching.	2
UNIT-5 Basic Data Structures Records/structure (heterogeneous aggregates), Strings and string processing. Arrays (Multi-dimensional),	1
UNIT-6 Memory Management and C Pointers Static & Dynamic memory allocation, Memory referencing and Dereferencing, Single-linked data-structures: lists – stack, queue disciplines.	1
UNIT-7 File Management Formatted I/O including file I/O Declaration, definition and accessing	1

Textbook references (IEEE format):

Text Book:
1. As per CSE 104
2. Laboratory notes and in-lab support

Evaluation Methods:

The laboratory course is organised to support individual student to achieve the best standard consistent with their background and interests. To be responsible to this goal, students' laboratory achievements (for the purpose of assigning subject grades to the students) will be evaluated through three 2-hour examinations.

Laboratory Examination Schedule:

The laboratory examinations are scheduled at the following lab sessions:

1. The first examination slot: At student's first scheduled lab-session after the mid-term examination period.
2. The second examination slot: At student's second-to-last scheduled lab-session near the end of the semester.
3. The third and last examination slot: At student's last scheduled lab-session near the end of the semester.
4. Make-up examination slot: Only one missed examination slot will be covered for rare and genuine cases. The makeup exam will be scheduled on the day immediately after the end-semester examination period. In-lab assessment (see below) records will be used to determine the cases who may benefit from a makeup examination.

Assessed Course Topic Units:

For the purpose of determining subject grade for a student, each student will be assessed, in sequence, using the prescribed sets of units listed in section Course Topics. A student will be assessed only on one unit-set at an examination. The assessable unit set for a student at an examination will be the one immediately above their previous successful assessment. A student who fails an assessment may re-appear for assessment in their following examination slot (if available).

Assessment sets – Competences tested at laboratory examinations:

1. Assessment Set Level 1: Assessment topics include units 1 to 3. List of possible outcomes:
   a. C: Successfully demonstrated lab competence for unit 3 for the examined programming problem.
   b. D: Demonstrated lab competence at unit 1 stage but not for unit 3 for the examined programming problem.
   c. F: Failed to demonstrate competence for any unit 1 or 3 for the examined programming problem.
2. Assessment Set Level 2: Only permitted after student has outcome of C from level 1. Assessment topics for evaluation include units 1 to 5. List of possible outcomes:
   a. B: Successfully demonstrated lab competence on the examined programming problem.
   b. C: Failed to demonstrate in-lab competence on the examined programming problem.
3. Assessment set Level 3: Only permitted after the student has outcome of B from level 2. Assessment topics for evaluation include units 1 to 7. List of possible outcomes:
   a. A: Successfully demonstrated lab competence on the examined programming problem.
   b. B: Failed to demonstrate lab competence on the examined programming problem.

In laboratory Progress Assessment:
The primary purpose of the laboratory sessions is to support students in learning to program using hand-on training supported by the lab tutors. The students will be advised in the first half of the semester when they should move to the higher level of the training problems in their labs sessions.

The in-lab progress will be, however, recorded formally in the second half of the semester. A student must complete a minimum of two active-learning laboratory sessions before seeking an in-lab progress assessment from their tutor. The tutor may record assessment based on their observation of the student's performance, viva-voce/interview, or may assign a small programming test exercise to assess the student.

In lab progress assessment would be used for deciding on the rationality of the make-up examination and/or for small adjustment in the student's subject grade where appropriate. As minimum of two genuine lab sessions of training are necessary before each progress assessment, a student will have no more than two progress assessments during (second-half of) the semester.

In-Lab Progress Assessments:
1. A student with the first examination grade F and those who missed the first examination:
   a. Student would work for minimum two sessions practicing topics in unit 1 before seeking progress assessment for unit 1.
   b. After they receive successful progress for unit 1, they work for further two sessions on topics in units 2-3 before seeking progress assessment on unit 3.
2. A student with the first examination grade D:
   a. Student would work for minimum two sessions practicing topics in units 2-3 before seeking progress assessment for unit 3.
   b. After they receive successful progress for unit 3, they work for further two sessions on topics in units 4-5 before seeking progress assessment on unit 5.
3. A student with the first examination grade C:
   a. Student would work for minimum two sessions practicing topics in units 4-5 before seeking progress assessment for unit 5.
   b. After they receive successful progress for unit 5, they work for further two sessions on topics in units 6-7 before seeking progress assessment on unit 7.

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