# Department of Computing

**CS213: Advanced Programming**

**Class: BSCS – 5C**

# Lab 1: Development and Analysis of Matrix Multiplication Algorithms

**Date: September 15, 2017**

# Time: Friday (14:00 – 17:00)

# Instructor: Shamyl Bin Mansoor

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# Lab 1: Development and Analysis of Matrix Multiplication Algorithms

## Introduction

In this lab the students have to develop, test and analyze algorithms for multiplying two matrices using the traditional Iterative method and Strassen’s algorithm for matrix multiplication.

If **A** is an *n × m* matrix and **B** is an *m × p* matrix, then their product **AB** is *n × p*

In case of traditional iterative method

where each *i, j* entry is given by multiplying the entries **Aik** (where i=1,2,…,n) by the entries **Bkj** (where j=1,2,…,p), and summing the results over k(where k=1,2,...,m)

A simplified version of the Strassen’s algorithm can be viewed at https://en.wikipedia.org/wiki/Strassen\_algorithm

## Objectives

* Develop a library for matrix multiplication with the traditional iterative method and Strassen’s algorithm.
* Ensure your code is maintained on GitHub.

## Tools/Software Requirement

* Solutions can be developed in any language preferable Python, C++ or Java. However, ensure that your code is well documented to be easily understood.
* **Do not use any external library for matrix multiplication.**

**Description**

Each student must, individually build the complete application on their own. Students must upload their solutions on LMS to qualify for evaluation.

* Any exceptions or errors leading to non-execution of submitted code.
* Failure to upload the solution on LMS.
* Failure to submit original code.
* Using any external library for matrix multiplication.
* Failure to explain the submission, during viva.

**Lab Task**

Develop a library for matrix multiplication with the traditional iterative method and Strassen’s algorithm. Maintain your code on GitHub  .

## Deliverables

* Each submission is individual with the following composition:
  + Source Code
  + Documentation (Introduction, Approach, How to Run and Analysis)
  + Link to the public repository preferably on GitHub
* Convert your submission files into a zip folder and name it as given below, finally upload the zip folder to LMS.
  + Name – Registration No. – Section

## Grade Criteria

This lab is graded. Min marks: 0. Max marks: 10.

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| --- | --- | --- |
| **Activity** | **Minimum** | **Maximum** |
| Documentation with clearly defined understanding of the lab task and approach | 0 | 1 |
| Code clarity with clean, formatted and commented code. | 0 | 1 |
| Matrix Population | 0 | 1 |
| Iterative Matrix Multiplication | 0 | 2 |
| Strassen’s Matrix Multiplication | 0 | 3 |
| Viva | 0 | 2 |
| **Total** | **0** | **10** |

**Links for Learning:**

<https://en.wikipedia.org/wiki/Strassen_algorithm>

<https://www.youtube.com/watch?v=E-QtwPi620I>

http://www.cs.mcgill.ca/~pnguyen/251F09/matrix-mult.pdf