



Lahore University of Management Sciences

CS100 – Computational Problem Solving

Fall 2013-14

Instructor(s)	Murtaza Taj
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Course URL (if any)	LMS

Course Basics				
Credit Hours	3			
Lecture(s)	2 Per Week		Duration	75 minutes each
Recitation/Lab (per week)	1/1 Per Week		Duration	50 min / 3 hours 50 min
Tutorial (per week)	0 Per Week		Duration	0

Course Distribution	
Core	Yes
Elective	No
Open for Student Category	Freshmen
Close for Student Category	

COURSE DESCRIPTION
<p>This course introduces students to the use of computers in modeling and solving real-world scientific problems. The course is practical in nature, containing several lab assignments and a project, involving mechanics simulations, Biology simulations, optimization problems and Monte-Carlo simulations. Concepts of time and space complexity of algorithms, error propagation and estimation are also introduced in this course. An additional objective of the course is to familiarize students with the discipline of Computer Science. The scripting language used is MATLAB.</p>

COURSE PREREQUISITE(S)
<ul style="list-style-type: none">••• None

COURSE OBJECTIVES
<ul style="list-style-type: none">• To familiarize students with the discipline of Computer Science• To introduce techniques and tools for problem solving via computations• Expose students to exciting applications of problem solving via computations



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Learning Outcomes	
<ul style="list-style-type: none"> • • • 	<p>To introduce the fundamental concepts of coding and scripting languages</p> <p>Understanding of structured programming, sub routines and its advantages over global programming</p> <p>The course will help student develop a relationship between mathematical models and simulation</p>
Grading Breakup and Policy (Tentative)	
<p>Assignment(s): 15% (Labs)</p> <p>Home Work: 0%</p> <p>Quiz(s): 15% (unannounced)</p> <p>Class Participation: 0%</p> <p>Attendance: 0%</p> <p>Midterm Examination: 20%</p> <p>Project: 20% (up to 5% additional bonus points for exceptional work)</p> <p>Final Examination: 30%</p>	

Examination Detail	
Midterm Exam	<p>Yes/No: Yes</p> <p>Combine Separate:</p> <p>Duration: 120 minutes</p> <p>Preferred Date:</p> <p>Exam Specifications: Written</p>
Final Exam	<p>Yes/No: Yes</p> <p>Combine Separate:</p> <p>Duration: 180 minutes</p> <p>Preferred Date:</p> <p>Exam Specifications: Written</p>

COURSE OVERVIEW – REGULAR LECTURES		
Week/ Lecture/ Module	Topics	Recommended Readings
Week 1	Course Info, assignments, variables, vectors, math operations and plotting	Lab Handouts
Week 2	Variables, assignments, vectors and matrices	Lab Handouts
Week 3	for loops (without index), for loops (with index), AND and OR operators, graphics using loops, random numbers	Lab Handouts
Week 4	for loops (with index manipulations, with m-files), counter and accumulators, debugging (stepping through)	Lab Handouts
Week 5	for loops (with conditions, with m-files)	Lab Handouts
Week 6	More complicated conditions, nested conditions, reverse and vector loops	Lab Handouts
Week 7	Summary of the taught concepts	Lab Handouts
Week 8	Structured programming, subroutines, local vs. global programming, Design Patterns	Lab Handouts
Week 9	Functions basics and workspace	Lab Handouts
Week 10	Nested function calls and variable stack	MATLAB Help
Week 11	Cells, Structures and GUI	MATLAB Help
Week 12	2D and 3D Graphics	MATLAB Help
Week 13	GUI and Call backs	MATLAB Help



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COURSE OVERVIEW – TOPICAL LECTURES	
Week/ Lecture/ Module	Topics
Week 1	Computer Vision
Week 2	Simulation
Week 3	Mauza Mapping Project with SUPARCO and Survey of Pakistan
Week 4	Modeling
Week 5	Introduction to Computing Machine
Week 6	Summary of the taught concepts
Week 7	Computer Graphics
Week 8	Game Programming: Invited Talk by CEO of Mind Storm Studios
Week 9	Deep Blue and Deep Q&A of IBM
Week 10	Artificial Intelligence
Week 11	Algorithms
Week 12	Entrepreneurship: Invited Talk
Week 13	Cyber Security: Invited Talk (tentative)

Textbook(s)/Supplementary Readings
<p>Supplementary Reading</p> <ul style="list-style-type: none">• Essential MATLAB for Engineers and Scientist 3rd Edition by Brian Hahn and Daniel T. Valentine, ELSEVIER• MATLAB Help & Documentation