Department of Computer Science
Lahore College for Women University, Lahore.

Self-Assessment Report
MS Program

Submitted to

Quality Enhancement Cell

Lahore College for Women University, Lahore

Task accomplished by:

1. **Dr. M. Mohsin Nazir (Associate Professor, Computer Science Department)**
2. **Dr. Maria Anjum (Assistant Professor, Computer Science Department)**
3. **Ms. Maria Saleemi (Assistant Professor, Computer Science Department)**

T A B L E O F C O N T E N T S

INTRODUCTION

The history of the Department of Computer Science dates back to 1996 when it started as a computer center by the grant provided by Ministry of Social Work and Women Development. The Department started ICS classes in 1997 in addition to offering Short Courses and Diploma. The lab facilities were extended with the grant from Punjab Information Technology Board and started BCS classes in 1999. The Department started 4 year BSCS degree program in 2000 and expanded its facilities in 2001 with the funding provided by Higher Education Commission. MSCS degree program was introduced in 2002. The Department was shifted in its new building in 2005. The Department started PhD degree program in 2011.

Currently, the Department is equipped with high speed internet of 400 MB bandwidth supported by fiber backbone, and video conferencing facility. There are total 7 labs (with 40 computers in 3, 35 computers in 2 and 30 computers in 2 labs). Departmental library has more than 15000 books for graduate and postgraduate students. Moreover, the Department has access to international journals and scholarly publications through HEC Digital Library. The syllabi are duly upgraded and modernized to make them abreast with the international standards. The department currently enrolls students for 4 years Bachelor's degree (BS Computer Science), 2 years Master degree (MS Computer Science) and Ph.D. program.

Mission of the Department

The Department strives to produce highly skilled professionals who apply specialist skills and knowledge to everyday workplace situations. Besides having highly developed technical abilities they are expected to carry out research and to keep their knowledge continually up-to-date. Most importantly, they are required to have excellent communication skills. To set pace in the field of study, the Department has designed several degree courses that provide balanced coverage of the various aspects of Computer Science. These programs are intended to produce graduates who have acquired:

- Depth and breadth of knowledge in computer science coupled with the capacity to produce feasible and responsible solutions to complex computing problems.
- Literacy in writing, reading, speaking, and listening.
- Critical thinking in interpretation, analysis and evaluation.
- Values by the ability to make reasoned and ethical choices and to accept responsibility for them.
- Interpersonal skills with leadership ability, appreciation for diversity, and the capacity to work effectively with others.

- Life-long learning skills as evidenced by the ability to adapt to innovation and change.

  The core values of the department are:

  - ➡ Quality
  - ➡ Integrity
  - ➡ Character building
  - ➡ Hard work
  - ➡ Respect
  - ➡ Accountability
  - ➡ Objectivity
  - ➡ Transparency
  - ➡ Confidence
  - ➡ Team spirit

Teaching Methodology:

All courses included in the curriculum are an excellent mix-match of various methods such as lectures, seminars, assignments, workshops, tutorials, quizzes and group discussions. This helps the students in developing the ability to collect, recognize and interpret the information through various sources like library and digital library, labs and the internet. This creates originality amongst students enabling them to work hard with sharp learning skills.

CRITERION 1: PROGRAM MISSION, OBJECTIVES AND OUTCOMES

Quality Policy of Computer Science Department:

Our aim is to achieve excellence through provision of quality education. To achieve this commitment, we focus:

- To produce quality post graduates equipped with a wide breadth of knowledge.
- To develop strong critical, analytical and logical thinking in the graduates.
- To establish effective communication and interpersonal skills in the post graduates.

We continually improve the effectiveness of our quality management system through human resource development and active faculty/student participation.

Standard 1.1: The program must have documented measurable objectives that support Faculty / College and institution mission statements.

Table 1: Module Description

Name of Programs	Duration	No. of Modules	Total Credit Hrs
M.S Computer Science	2 Years	4 Semesters (Course work + Research)	12+12+12=36

1.1: PROGRAM'S OBJECTIVES

1.1.1 M.S. COMPUTER SCIENCE

This degree is based on the approved curriculum from HEC, Departmental Board of studies, Board of Advance and Research Studies and Academic Council of Studies. In the first year the students learn compulsory courses and advance courses related to the area of specialization offered by the department (Networks and Software Engineering). In the second year students work on their research thesis in the offered area of specialization.

1.1.2 M.S. COMPUTER SCIENCE Program Objectives:

Following are the learning objectives of the MS Computer Science program:

1. To produce quality graduates equipped with a focused depth of a specialized domain of computing knowledge.
2. To develop a strong and critical reasoning necessary for research.
3. To establish effective communication and interpersonal skills in the graduates.
4. Identify, develop and focus on a thorough knowledge of a specific research topic dealing with one or more areas.

1.1.3 Strategies are based on:

i) Designing the program as per requirements of the students.
ii) Develop curriculum according to the need of the program.
iii) Regular revision of curriculum to keep them updated with the developing technologies and HEC guidelines.
iv) Providing all resources including class room facilities, multimedia, video conferencing room, computers, internet, library and properly equipped laboratories.
v) Updating the knowledge of teachers through workshops and training programs.
vi) Encouraging the establishment of linkages at national and international level.

vii) Establish liaison with the potential employers and provide economical consultancy services.

viii) Develop moral basis of the students to impart concept of team, honesty and discipline through ethical attitudes.

Assessment of Educational Objectives of each Program:

Table 2: MS Programs Objectives Assessment

OBJECTIVES **(1)**	**HOW MEASURED** **(2)**	**WHEN MEASURED (FREQUENCY)** **(3)**	**IMPROVEMENT IDENTIFIED** **(4)**	**IMPROVEMENT MADE (CORRECTIVE & PREVENTIVE ACTION)** **(5)**
As given in Standard 1.1	1 Regular assessment of student knowledge and ability to exhibit the skill by the teacher:	Regular	1) Regularity of attendees required 2) Work based teaching 3) Course / curriculum revision to enhance outcomes 4) Enhancing communication skills 5) Guidance to students	1) Attendance rules applied more strictly 2) Teachers training and development 3) Student encouraged to enhance their writing skills 4) Course / curriculum revised 5) Students are encouraged to attend the national and international workshops /seminars /conferences
	i) Class tests	1 pre mid term		
	i) Class exercises relating to problem	1 pre mid term, 1 post mid term		
	ii) Presentation of relevant topic	Once/ twice in a semester		
	iii) Quizzes	Twice in a semester		
	2. Written examination	Twice during each semester		
	3. Practical assignment in each modules	Once/ twice in a semester		
	4. Discussions/ tutorial	Once a week		
	5. Research Thesis	Once during program		
	6. Teaching/ Learning Process Survey (teachers' evaluation by the student)	Once in a semester	Shortcomings as per survey identified	Teachers are intimated the survey report who make effort to improve which is monitored in next survey
	7. Faculty	Once in a	1) More time to	All the improvements

OBJECTIVES (1)	HOW MEASURED (2)	WHEN MEASURED (FREQUENCY) (3)	IMPROVEMENT IDENTIFIED (4)	IMPROVEMENT MADE (CORRECTIVE & PREVENTIVE ACTION) (5)
	Survey Form	semester	be spent on the following during teaching: i. Teacher student interaction ii. Personal development topic like ethic, moral & code of conduct iii. Improvement in quality of iv. Administrative support	identified have been implemented
	8. Suggestion received from students	As and when received	1) Administrative and personal problems of students 2) Laboratory facilities	Complaints are addressed immediately
	9. Students / Quality Assurance Advisor liaison			
	New Introductions			
	1. Alumni Survey:	Once a year	-	-
	2. Survey of Students:	Once a year	-	-
	3. Latest Research Student Progress Review	Monthly progress report in the final year of study	Easy access to research material such as research papers, journals, books and conferences	Access of library, digital library available + HEC regional office journal/ conference papers access
	4. Faculty Resume	Once a year	1. Qualification 2. Training	1) Sent for higher studies 2) Internal and external training arranged

Standard 1.2: The program must have documented outcomes for graduating students. It must be demonstrated that the outcomes support the program objectives and that graduating students are capable of performing these outcomes.

1.2.1 MS Computer Science Program's Outcomes:

Following are expected outcomes

1. To prepare such professional as to uplift the economic situation of the country.
2. To strengthen the foundations for further learning and research.
3. To produce graduates with convincing capabilities.
4. Acquire high tech research skills to be used for their career development at national and international level.

Table 3: MS Program Outcomes

Program Objectives	Program Outcomes			
	1	**2**	**3**	**4**
1	X	X	X	X
2	X	X	X	X
3	X	X	X	X
4	X	X	X	X

Standard 1.3: The results of program's assessment and the extent to which they are used to improve the program must be documented.

1.3.1. a. Actions taken on the basis of assessment:

1) Syllabus revision
2) Teachers training
3) Labs facility development/ digital library access
4) Faculty development

1.3.1.b. Strengths of Department:

i) Teamwork
ii) Work Environment
iii) Well-equipped Labs
iv) Video conferencing room
v) HEC digital library access
iv) Library
v) Internet facility

1.3.1. c. Weaknesses of Department:

i) Latest hardware / software facilities

ii) Common room for students

Standard 1.4: The department must assess its overall performance periodically using quantifiable measures.

1.4.1: Performance Measures:

Computer Science department assesses the overall performance using quantifiable measures e.g. statistical method.

i) Student's enrollment
ii) Student passed out
iii) Attrition rate
iv) Student teacher ratio
v) Number of Publications
vi) Number of projects
vii) Books in Library
viii) Linkages and collaborations with other institutes and organizations
ix) Workshops and seminars
x) Purchase of equipment

Table 4: Student's enrollment

Program	Year of Enrollment	No. of Students
M.S. Computer Science	2013-15	26
M.S. Computer Science	2014-16	20
M.S. Computer Science	2015-17	27
M.S. Computer Science	2016-18	15
M.S. Computer Science	2017-19	26
M.S. Computer Science	2018-20	50

Table 5: Student passed out

Program	Year of Enrollment	No. of Students
M.S. Computer Science	2018	-
M.S. Computer Science	2017	-
M.S. Computer		**11**

Science	2016	
M.S. Computer Science	2015	**20**

Table 6: Attrition rate

Program	Year	%age of Honor Students	Attrition rate (%)
M.S. Computer Science	2010-2012	9	37.5

Student securing 3.75 CGPA are awarded with roll of honor.

Table 7: Student teacher ratio

Year	No of students	Teachers (teaching graduate & Postgraduate)	No of students per teacher
2017	41		
2018	76		

Table 8: Number of Publications

Year	Papers published
2016	16
2017	16

Table 9: Books in Library

Year	Total Books
2018	15000

Table 10: Linkages with other institutes and industry

Year	2018
No. of linkages	-

1.4.2: Research Areas

The Faculty is involved in research in the following areas:

- Software Engineering
- Net-Centric Computing
- Image Processing

- Computer Vision
- Information Communication Technology

1.4.3: Collaborations

1.4.4: ACADEMIC CALENDER 2018-2020

CRITERION 2: CURRICULUM DESIGN AND ORGANIZATION

➡ Curriculum of Computer Science for each program is developed on the basis of detailed guidelines given by the HEC.

PROGRAM MS. COMPUTER SCIENCE

Road Map for MS Computer Science (2016-2018)

Scheme of Study for MSCS 2016-2018 & Onwards (36 Credit Hours)

Semester I (12)	Semester II (12)	Semester III (6)	Semester IV (6)
CS-501 3 (3,0) Advanced Theory of Computation	CS-505 3 (3,0) Research Methodology	CS-6XX 6 (0,6) 6 (0.6) Thesis	
CS-502 3 (3,0) Advanced Algorithm Analysis	CS-5XX 3 (3,0) Elective-I		
CS-503 3 (3,0) Advanced Operating Systems	CS-5XX 3 (3,0) Elective-II		
CS-504 3 (3,0) Advanced Computer Architecture	CS-5XX 3 (3,0) Elective-III		

Standard 2.1: The curriculum must be consistent and supports the program's documented objectives.

➡ MS Computer Science program contents/courses meet the program objectives as shown in the table.

Table 11: MS Courses versus Program Objectives

Courses/Groups		Objectives

of Courses		1	2	3	4
CS-501	Advanced Theory of Computation	X	X	X	X
CS-502	Advanced Algorithm Analysis	X	X	X	X
CS-503	Advanced Operating Systems	X	X	X	X
CS-504	Advanced Computer Architecture	X	X	X	X
CS-505	Research Methodology	X	X	X	X
CS-506	Advanced Image Processing	X	X	X	X
CS-507	Advanced Computer Vision	X	X	X	X
CS-508	Machine Learning	X	X	X	X
CS-509	Advanced Computer Networks	X	X	X	X
CS-510	Advanced Network Security	X	X	X	X
CS-511	Wireless and Mobile Computing Networks	X	X	X	X
CS-512	Software Quality Assurance	X	X	X	X
CS-513	Requirement Engineering	X	X	X	X
CS-514	Software Design	X	X	X	X
CS-515	Information Visualization	X	X	X	X
CS-516	Software Architecture	X	X	X	X
CS-517	Decision Support Technologies	X	X	X	X
CS-612	Thesis	X	X	X	X

Standard 2.2: Theoretical background, problems analysis and solution design must be stressed within the program's core material.

Program: MS COMPUTER SCIENCE

The modules of all the programs adequately address:

1) Theoretical background
2) Problem solving
3) Solution design
4) Application of the theoretical knowledge

- ➡ Some of the modules include the theoretical background and contain problem solving and solution design while others deal with Theoretical background, Problem analysis and Solution design separately.
- ➡ Great emphasis of the program is on problem solving strategies and design of solution.
- ➡ Research aspect of each course is also included and students are encouraged to produce research work and results.
- ➡ All the modules provide adequate and practical application of the knowledge in different specializations with the exploitation of advance techniques.

Table 12: Standard 2-2 requirement for MS Program

Elements	Courses
Theoretical background	4
Problem analysis	7 + Thesis
Solution design	7 + Thesis
Application of the theoretical knowledge	11 + Thesis

Standard 2.3: The curriculum must satisfy the core requirements for the program, as specified by the respective accreditation body.

The curriculum satisfies general education disciplines requirements. No formal accreditation with any professional body but it fulfills all the necessary/basic requirements of the accreditation body. The programs and curriculum have the approval of Board of Studies and Lahore College for Women University.

Standard 2.4: The curriculum must satisfy the major requirements for the program as specified by the respective accreditation body.

The curriculum satisfies major requirements of the program. No formal accreditation with any professional body. The programs and curriculum has the approval of Board of Studies.

Standard 2.5: The curriculum must satisfy general education, arts, and professional and other discipline requirements for the program, as specified by the respective accreditation body/council.

The curriculum satisfies general education disciplines requirements. No formal accreditation with any professional body but it fulfills all the necessary/basic requirements of the accreditation body. The programs and curriculum has the approval of Board of Studies of Computer Science and LCWU.

Standard 2.6: Information technology component of the curriculum must be integrated throughout the program.

This requirement is fulfilled by all the courses as well.

Standard 2.7: Oral and written communication skills of the student must be developed and applied in the program.

Oral and written communication skills of the student are developed by the structurally designed courses for English, seminars, question answers, presentations and by the class participation of the students.

CRITERION 3: LABORATORIES AND COMPUTING FACILITIES

Standard 3.1: Laboratory manuals/documentation/instructions for experiments must be available and readily accessible to faculty and students.

➡ The MS program has no exclusive requirements of labs manuals.

Standard 3.2: There must be adequate support personnel for instruction and maintaining the laboratories:

➡ Faculty members themselves are responsible for instructions and tutorial related to the practicals. Laboratory staff is responsible for the maintenance of hardware and software and other equipment.

Standard 3.3: The university computing infrastructure and facilities must be adequate to support program's objectives:

➡ The computing infrastructure of the Computer Science department is adequate. There are 07 computer labs with adequate computers for the use of the students. The number of computers is constantly under review.

CRITERION 4: STUDENT SUPPORT AND ADVISING

Standard 4.1: Courses must be offered with sufficient frequency and number for students to complete the program in a timely manner:

➡ The strategy for programs (courses) offering is controlled. The MS courses are offered once a year.

Standard 4.2: Courses in the major area of study must be structured to ensure effective interaction between students, faculty and teaching assistants:

- ➡ The effective student/faculty interaction in programs taught by more than one faculty members is streamlined by coordination of these faculty members and the commonality is maintained through any curriculum which is adopted for the particular module.
- ➡ The programs are structured to ensure effective interaction between students, faculty and the Head of Department. The students requiring extra help are provided services through tutorials, questions and answers. Questions are encouraged by the faculty from the students. Seminars are arranged where the students are free to discuss the topics relating to the program. The students are free to interact with the class in charge and Head of department in case of any shortcoming.

Standard 4.3: Guidance on how to complete the program must be available to all students and access to academic advising must be available to make course decisions and career choices:

- ➡ The students are provided guidance regarding the completion of the programs and having access to qualified faculty as well as student counseling. The students are encouraged to bring forward their suggestions and complaints through a complaint box which is maintained in the Institute. The students once in semester carry-out the teacher's evaluation. Also the weekly work plan and the course outlines are made available to the students in the beginning of the semester.

  The counseling is availed at the Student counseling center of the university which deals with various issues.

CRITERION 5: PROCESS CONTROL

Standard 5.1: The process by which students are admitted to the program must be based on quantitative and qualitative criteria and clearly documented. This process must be periodically evaluated to ensure that it is meeting its objectives:

MS Computer Science

This is a 2 year degree program with minimum 36 credit hours. The program is divided in 4 semesters with 2 semesters each year.

Eligibility Criteria:

- BS……2.5+ GPA and Dept. Test

- Departmental Entry test: ……. Pass percentage 50%
- Interview …….. Pass percentage 50%

Standard 5.2: The process by which students are registered in the program and monitoring of students' progress to ensure timely completion of the program must be documented. This process must be periodically evaluated to ensure that it is meeting its objectives:

➡ Advertisements are made in leading newspapers and on Lahore College for Women University website. The student academic progress is monitored regularly by the regular written examination system. The process of registration and monitoring are reviewed once in a year three months before the date of admission.

➡ Students requiring admission in M.S. Computer Science program who have qualified from private universities are required to give equivalence certificates/ NOC as per rules of Lahore College for Women University.

Standard 5.3: The process of recruiting and retaining highly qualified faculty members must be in place and clearly documented. Also processes and procedures for faculty evaluation, promotion must be consistent with institution mission statement. These processes must be periodically evaluated to ensure that it is meeting its objectives:

➡ The standards are clearly indicated in the University Calendar which is followed. Qualifications which are required for each subject are kept in mind. The criteria for recruiting are qualification, experience which is judged through analysis of CVs, written test and personal interviews. In case of permanent faculty members, the recruiting is done by a board constituted by Lahore College for Women University whereas; visiting faculty members are recruited by a board constituted by the Institute. The input of the students for maintaining the quality of the teachers is done by evaluating the teachers regularly once in a semester by the students. The results of these studies are sent to the teachers who are asked to improve and in extreme cases, replacements are made.

Standard 5.4: The process and procedures used to ensure that teaching and delivery of course material to the students emphasizes active learning and that course learning outcomes are met. The process must be periodically evaluated to ensure that it is meeting its objectives:

➡ There are process and procedure to ensure that the teaching and delivery of the program material to the students emphasizes active learning. For instance, exercises, tasks,

activities, assignments and research assignments based on practicality of the knowledge are given to the students and research thesis is initiated at the end of the program. Process is monitored and assessed regularly through monthly progress reports.

Standard 5.5: The process that ensures that graduates have completed the requirements of the program must be based on standards, effective and clearly documented procedures. This process must be periodically evaluated to ensure that it is meeting its objectives

- ➡ The semester rules have been adopted by the department according to the rules provided by the examination. Head of Department ensure their compliance.
- ➡ This operation is reviewed once a year and is documented.

CRITERION 6: FACULTY

Standard 6.1: There must be enough full time faculty members who are committed to the program to provide adequate coverage of the program areas/courses with continuity and stability. The interests and qualifications of all faculty members must be sufficient to teach all courses, plan, modify and update courses and curricula. All faculty members must have a level of competence that would normally be obtained through graduate work in the discipline. The majority of the faculty must hold a Ph.D. in the discipline:

- ➡ There is adequate full time faculty which provides adequate coverage of the program with continuity and stability. The interest and the qualifications of all faculty members are pre-judged and monitored for each course forming a part of the program. The level of competency of the faculty members are evaluated at time of induction and monitored during teaching.

Table 13: Faculty per module

Program areas	Module in area and semester per year	Number of faculty members with MS degree	Number of faculty with Ph.D. degree
MS	8 Courses + 1 year research 02 Semesters per year	27	07

Standard 6.2: All faculty members must remain current in the discipline and sufficient time must be provided for scholarly activities and professional development. Also, effective programs for faculty development must be in place:

All the faculty members remain current in the disciplines and sufficient time is provided for scholarly activities and professional development. The newly inducted faculty is given enough time to familiarize with the working environment of the Institute. During this time, they are monitored. Faculty is provided with centralized training by Registrar's office through DFDI at university, National Academy for Higher Education (NAHE) at HEC and other independent organizations / institutions. They are encouraged to attend international seminars. Some of the faculty members had opportunity to get training and research experiences from foreign universities/institutions.

Standard 6.3: All faculty members should be motivated and have job satisfaction to excel in their profession:

- The faculty members are regularly motivated and efforts are made to provide job satisfaction so that they excel in their profession.

CRITERION 7: INSTITUTIONAL FACILITIES

Standard 7.1: The institution must have the infrastructure to support new trends in learning such as e-learning

Academic Building: (Dedicated/Owned)

1. Class rooms: 00
2. Computer Lab: 01
3. Conference Room: 01
4. Video Conferencing Room: 01
5. H.O.D Office: 01
6. Staff Room: 01
7. Shared faculty offices 08

- Department building is fully equipped with all latest new technology.
- Projectors are used in the labs.
- Internet facility is available throughout department.

- Access to HEC digital library.

Standard 7.2: The library must possess an up-to-date technical collection relevant to the program and must be adequately staffed with professional personnel:

- 15000 of up-to-dated books are available in the library that covers all the areas of programs.
- Institute provides services of digital library.
- Common Science library is also available for books borrowing.

Standard 7.3: Class-rooms must be adequately equipped and offices must be adequate to enable faculty to carry out their responsibilities:

- 1 lab, one conference room and one video conferencing room.
- Office of Head of department, 1 staff room and shared faculty offices

CRITERION 8: INSTITUTIONAL SUPPORT

Standard 8.1: There must be sufficient support and financial resources to attract and retain high quality faculty and provide the means for them to maintain competence as teachers and scholars:

- Teachers are recruited on the basis of criterion established by the University.
- Existing faculty is sent to different courses of teaching organized to update the knowledge.
- Research incentive award by the university

Standard 8.2: There must be an adequate number of high quality graduate students, research assistants and Ph.D. students:

In 2018
MS Students **50**

Standard 8.3: Financial resources must be provided to acquire and maintain Library holdings, laboratories and computing facilities:

- Budget for Laboratory equipment is 0.1 Million

Annexure 1

Curriculum Book