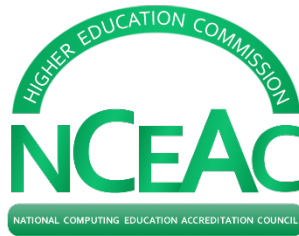


ACCREDITATION MANUAL
of the
**NATIONAL COMPUTING EDUCATION ACCREDITATION
COUNCIL**



Established by the
HIGHER EDUCATION COMMISSION OF PAKISTAN



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Chairman's Message

National Computing Education Accreditation Council (NCEAC) is the Regulatory Body to undertake multiple tasks; one of these is to regulate the conduct of computing education through accreditation in the country. The Council is committed to offering accreditation of computing programs, which is highly beneficial for students, their parents, employers and society. Over the past one decade, the Council has made significant progress that has been shared with all stakeholders on a regular basis. As an organization, NCEAC emerged as a highly reputed name for accreditation amongst the Pakistani society. The Council also expanded the accreditation frontiers and has accredited 359 programs at 295 Institutions countrywide. As a result, various formats/proformas used in the assessment process have been revised and updated accordingly. A major achievement in this regard is the publication of the second edition (updated version) of Accreditation Manual in September 2023. It has also incorporated all aspects of the accreditation process. It is expected that this manual will provide guidelines to institutions and other stakeholders to meet the required quality assurance standards.

We believe in a quality accreditation system. The accreditation of computing programs is of a specialized nature. Therefore, the Council has trained a record number of new Program Evaluators (PEs) during the past 10 years. The training of PEs is a regular feature and continued even during the COVID-19 pandemic through an online system. It is my pleasure to state that in addition to our growing accreditation activities, we are also experiencing an increase in the numbers of PEs. These PEs are vital to the accreditation process and play an important role in making field-audit visits successful. We are thankful to them.

In addition to roles of the NCEAC and PEs during the accreditation process, we are also engaging faculty and administrators of the institutes seeking accreditation. The roles of the faculty and administrators of the accrediting institutes are crucial. They are the people who are preparing the global technology professionals of tomorrow. The Council maintains a strong liaison with them and offers various training and consultation sessions to strengthen their capacity. Further, the Council has also involved stakeholders from the computing industry and national bodies related to computing and IT at various stages of the accreditation process from development of curriculum to the making of policies. The Council offers a significant number of slots in the General Council to industry. The Council also discussed the possibility of encouraging experts from the industry to be PEs and teach courses at the university with relaxation on the qualification for experienced individuals.

I also want to draw your attention to the new developments by making the accreditation process highly streamlined through this second addition of the accreditation manual. The process has now incorporated all characteristics of the Outcome Based Education System in an academic manner. The newly developed process of accreditation is also very close to the Seoul Accord's recommendations. I take pride that the NCEAC has started the effort for attaining the signatory status for Pakistan under the Seoul Accord. I request everyone to support our mission to produce top class computing graduates who can serve the society in the best possible manner.

We couldn't have prepared this manual without the incredible work and dedication of our team at the NCEAC secretariat and members of the General Council, who are committed to making a difference in the computing education students receive at institutions around the country. I will remiss if I did not specifically mention the focused and untiring efforts of Prof. Dr. Muhammad Ali Maud, Prof. Dr. Jamil Ahmad, Prof. Dr. Shoab Ahmad Khan, Hafiza Sumaira Hafeez, and Usama Ali in updating the manual. Thank you all.

Prof. Dr. Syed Mansoor Sarwar
Chairman NCEAC



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CHAPTER 1

INTRODUCTION TO ACCREDITATION

1.1 Introduction

Higher Education Commission (HEC) of Pakistan was established on 11th September 2002 by promulgation of Ordinance LIII OF 2002. HEC as per Article 10 Sub-Section 1(e) has been authorized to set up national or regional evaluation councils or authorize any existing council or similar body to carry out accreditation of programs by giving them appropriate ratings. The Commission shall help build the capacity of existing councils or bodies in order to enhance reliability of the evaluation carried out by them.

Since Computing had emerged as a major academic discipline and a professional field in Pakistan, numerous educational institutions were offering degree programs in computing related areas both in the public and private sectors. It had, therefore, become essential that an internationally acceptable and industrially viable set of standards and criteria may be evolved. Degree awarding institutions (DAIs) offering computing programs would be required to follow these standards and criteria to ensure quality computing graduates. HEC recognizing this need tasked the National Curriculum Revision Committee (NCRC) constituted for Computing programs to initiate work on setting computing standards to be followed by DAIs. Computer Science/ Computing NCRC carried out the necessary spade work in 2003 and 2004. The NCRC, in its recommendations, suggested a comprehensive mechanism to grant accreditation to computing related degrees/disciplines in Pakistan.

Considering the recommendations of NCRC, HEC established the National Computing Education Accreditation Council (NCEAC) February 16, 2005. This was the first council to be established by HEC for accreditation of academic programs offered in the country.

The Council ensures that the computing education being imparted to students is of high quality and meets the minimum standards prescribed by HEC. Accreditation by NCEAC is mandatory for every computing program offered by any public or private University/DAI in Pakistan. It is also mandatory for the affiliated colleges associated with any University/DAI.

1.2 Accreditation of Computing Programs

Improving the quality of computing education requires regular review, guidance, and quality improvement mechanisms. Accreditation process is considered an effective instrument to achieve these goals.

Accreditation protects and promotes the interest of all stakeholders, namely parents, students, faculty, academic administrators, employers, and taxpayers. It serves to provide information to:

- Parents and prospective students that a program is meeting minimum standards.
- The faculty and administration of the DAI about the program's strengths and weaknesses and of ways to improve the program.
- Employers that graduates are prepared to begin professional practice.
- Taxpayers that their funds are rightly spent; and

- The public that graduates are aware of public health and safety considerations.

In view of the above benefits, HEC has given the following policy guidelines to NCEAC and DAIs offering computing programs.

- Accreditation shall be a mandatory process for all relevant academic programs offered by public and private sector institutions. The incentives for obtaining such accreditation shall include enhanced recognition in the computing community and prospective students.
- All institutions in Pakistan, which grant a Recognized Computing Qualification, must apply to the Council to have such qualification accredited.
- Accreditation will be carried out under the umbrella of HEC and via the National Computing Education Accreditation Council.
- The Council shall publish a list of Accredited Programs as prescribed.
- The Recognized Computing Qualifications granted by institutions recognized by the respective authorized bodies outside Pakistan shall also be recognized by the Council as per need in case of Pakistani graduates of a computing program.
- Every institution in Pakistan which has an Accredited Program shall furnish such information as the Council may, from time to time, require as to the courses of study and examination to be undergone in order to obtain such Recognized Computing Qualification.
- The Council shall appoint such number of Program Evaluators (PEs) as it may deem requisite to attend at any or all of the examinations held by the institutions in Pakistan for the purpose of granting Recognized Computing Qualifications which are accredited or in respect of which accreditation has been sought.

1.3 Objectives

The main objective of the accreditation system developed by NCEAC is to ensure that the institute possesses certain facilities including the minimum required number of faculty to offer degree program in computing. This helps prospective students to gain confidence about the quality of education they can expect to receive at a particular university. It is a process to assure quality in degree programs in educational institutions. It would require an educational institution or program to meet defined standards or criteria.

Accreditation is useful for the following purposes:

- Guidance to DAIs for Improvement
- Ease Transfer of students between universities
- Recognition of Qualifications
- Increase Employer Confidence

The detailed objectives of the accreditation process are as follows:

- To ensure the value-addition in transforming students admitted to the program into capable computing professionals.
- To ensure that graduates of the computing accredited programs achieved all attributes

set by the NCEAC.

- c. To ensure that the graduates of computing accredited programs possess all necessary technical skills required by the job market.
- d. To ensure that the quality of resources at the institute which offers computing accredited programs, are up to the mark to award degree in computing disciplines.
- e. To ensure that the curriculum of accredited computing programs is designed and executed as per NCEAC standards and criteria.
- f. To ensure continuous improvement in the computing programs through accreditation and re-accreditation process.

1.4 Scope

Currently, NCEAC accredits the ten following degree programs: (listed in alphabetical order):

- a. BS Artificial Intelligence (4 Years)
- b. BS Bioinformatics (4 Years)
- c. BS Computer Science (4 Years)
- d. BS in Computer Engineering (4 Years)
- e. BS Cyber Security (4 Years)
- f. BS Data Science (4 Years)
- g. BS Information Systems (4 Years)
- h. BS Information Technology (4 Years)
- i. BS in Multimedia and Gaming (4 Years)
- j. BS Software Engineering (4 Years)

1.5 Need for Accreditation

The need and demand for accreditation of computing programs in Pakistan has arisen because of the expansion in the number and diversity of educational institutions offering computing programs. The main objective of the computing accreditation system is to validate and certify the quality and standards, which are used to award degrees in computing disciplines. The following benefits are associated with accredited degree programs.

Since higher education is a global phenomenon, the process of accreditation is crucial for national and international recognition of our computing programs. Further.

- a. NCEAC is a national body established by HEC recognized body for Higher Education Accreditation of Computing in Pakistan. It shall be responsible for the accreditation of educational programs leading to degrees in the discipline of computing.
- b. Its endorsement and certification shall be valued and drawn on by professional and technical societies, by employers, and by the institutions themselves for self-appraisal and improvement.

- c. NCEAC shall run and execute the accreditation programs on behalf of HEC under its guidance and instructions.

1.6 Provision of Accreditation in HEC Act 2002

As mentioned in the introduction that HEC as per the article 10 Sub-Section 1(e) has been authorized to set up national or regional evaluation councils or authorize any existing council or similar body to carry out accreditation of programs by giving them appropriate ratings.

HEC has made it mandatory through public notices that a degree in the computing domain will not be attested if awarded by an institution offering a non-credited program.

NCEAC has taken steps to facilitate DAIs in getting their computing programs accredited. It has formulated policies, procedures, trainings, and guidelines that will facilitate DAIs in accreditation of their computing programs.

1.7 Composition and Constitution of the Council

The Council consists of the following members, who have been nominated by the Controlling Authority in the first and subsequent instances namely:-

- a. The Chairperson.
- b. The Vice-Chairperson.
- c. A Representative of Higher Education Commission (ex-officio).
- d. A Representative of Ministry of Science and Technology (ex-officio).
- e. A Representative from Ministry of Information Technology and Telecommunication (ex-officio).
- f. One Representative each from Provincial Education/Information Technology Departments (ex-officio).
- g. Four members from leading software industry in the following manner (ex-officio):
 - i. Chairman Pakistan Software Export Board.
 - ii. President Pakistan Association of Software Houses.
 - iii. Two representatives from the software industry preferably with a strong academic background.
- h. Six members, being computing professionals.

1.8 Functions of the Council

- a. To organize and carry out a comprehensive program of accreditation of computing programs leading to degrees.
- b. The NCEAC shall propose policies, procedures, and criteria or may suggest changes or revisions of the same for Accreditation.
- c. The NCEAC shall administer the accreditation process based on the approved policies, procedures, and criteria.
- d. The NCEAC shall approve the list of evaluators to participate in the process of accreditation of academic programs.
- e. The NCEAC shall constitute Accreditation Inspection Committee (AIC) for the evaluation of relevant academic programs for accreditation. AIC (to be constituted from the approved list of evaluators) shall make recommendations to NCEAC. The

final decision of the accreditation or necessary action will be made by NCEAC.

- f. Procedures and decisions on all appeals with respect to accreditation actions shall be the responsibility of the NCEAC.
- g. Accreditation decisions will be based exclusively on the suitable criteria, policies, and procedures as approved by NCEAC.
- h. To publish a list of Recognized Computing Qualifications/programs.
- i. To promote intellectual development and understanding of subject areas that impact accreditation activities in the computing profession.
- j. To prepare, print and publish criteria for the teaching of, and training in Computing and its applications.
- k. To collect, index and publish information on any or all aspects of computing, its teaching applications, its applications and uses to industry and to maintain or support any library, bureau, database or information system conducive to this end.
- l. To select program evaluators (PEs).
- m. To train and assess program evaluators (PEs).
- n. To assist academic institutions in planning their educational programs for accreditation.
- o. To identify to the public, prospective students, student counselors, parents, educational institutions, professional societies, potential employers, governmental agencies, and state licensing or certification boards of specific programs that meet minimum criteria for accreditation.
- p. To provide guidance for the improvement of the existing educational programs and development of future programs leading to the computing profession.
- q. To stimulate the improvement of computing education in Pakistan.
- r. To develop Accreditation Policies and Processes
- s. To develop Guidelines and Procedures for PEs.
- t. To develop Guidelines and Procedures for Programs and Institutions
- u. To develop Guidelines for Selection of Evaluators
- v. To identify and develop Guidelines for Ensuring “No Conflict of Interest”
- w. To develop Program Evaluator’s Training Manual Self Study Questionnaire
- x. To develop Forms and Templates
- y. To collect information and statistics on accreditation of higher education of Computing and its respective Institutions as it may deem fit and may cause it published.

1.9 Accreditation Standards Committee (ASC)

The main function of the Accreditation Standard Committee (ASC) is to review reports received from the Program Evaluators (PEs) after a field visit. The ASC consists of the following members. All these members are also members of the General Council as mentioned above.

- a. The Chairperson.
- b. The Vice-Chairperson.
- c. A Representative of Higher Education Commission (ex-officio).
- d. Two Representatives from Software Industry.
- e. Six Members of Computing Professionals.

1.10 Program Evaluators (PEs) and Accreditation Inspection Committee (AIC)

The General Council of NCEAC approves the appointment as PE. The criteria for selection of PE is as under:

- a. PhD degree in computing or a related discipline.
- b. At least five years of post-PhD experience.
- c. Good professional repute.
- d. Taught for at least three years in a NCEAC accredited computing program.
- e. Must be residing/working in Pakistan.

During an accreditation visit, an Accreditation Inspection Committee (AIC) is formed with a convener and member. A PE qualifies to be appointed as Convener if he/she has evaluated at least four programs on behalf of NCEAC.

The GC of NCEAC may appoint more than one member in AIC if required.

1.11 Institutions Eligible for Seeking Accreditation

Programs will be considered for accreditation if they are offered by an institution of higher learning in one of the following categories:

- Institutions chartered by Federal or Provincial Governments.
- Institutions affiliated by the chartered universities or degree awarding institutions (DAIs).
- Institutions offering degree programs under affiliation/collaboration with foreign universities under the approval from HEC.
- Institutions that operate a branch campus under the direct supervision and control of the main campus, and conduct program that is substantially equivalent to the one located on the main campus.
- When a multi-campus institution presents programs for accreditation, each campus will be considered as a separate institution in the evaluation process.
- Any other Institute recognized by HEC to offer degree programs.

1.12 Types of Accreditation Visit

NCEAC has launched its online Accreditation Automation System (AAS) for accepting Self-Assessment Report (SAR)/ Accreditation Application of the institute. The AAS is available on the URL <https://accredit.nceac.org.pk>.

The following types of accreditation visits are undertaken.

- a. **Zero Visit:** This visit is conducted when an institution decides to launch a computing program. This visit determines whether the institution has the minimum required resources to launch the computing program. The outcome of the visit is either the DAI is permitted to launch the program, or it is not permitted to do so. In case of denial of permission, the reasons are communicated to the institution so that it may remove any deficiencies for a subsequent confirmatory zero visit.
- b. **Accreditation and Re-accreditation Visits:** Accreditation visit is the visit to accredit a computing program. It is expected that the institute fulfils all the accreditation requirements mentioned in the online system before the visit is arranged. It is the responsibility of institute to apply for accreditation using online system available <https://accredit.nceac.org.pk> when students reach to final year (7th semester). Program seeking accreditation for the first time is required to ensure submission of all required data as per the guidelines given on the AAS website. A re-accreditation visit is arranged for programs whose accreditation period has expired. It is the responsibility of the institute to apply for re-accreditation six months before the expiry of the accreditation period. Both accreditation and re-accreditation are conducted using the same procedure.
- c. **Confirmatory Visit:** Confirmatory visits are arranged under special circumstances to urgently address an important shortcoming discovered during the accreditation visit. The visit can also be arranged if the Council observes any major discrepancies in the evaluation reports and rejoinder of the Institute. If an institute has reservations on NCEAC General Council's decision regarding the outcome of their accreditation, then institute can apply for confirmatory visit.
- d. **Change-of-Scope Visit:** An accredited program would be required to apply for a Change-of-Scope visit under the following circumstances:
 - An increase in the student enrollment.
 - Any change which alters the fundamental aspect of the program such as
 - nomenclature of the program,
 - addition of new scheme/specialization,
 - change in the location of the institute, or
 - Change in the curriculum.

The application for change of scope must be submitted at least six-weeks before the change is required.

A change of scope will not be allowed before the program reaches maturity, defined as the completion of at least one accreditation visit. Programs awarded 'W' or 'X' category are eligible to apply for the Change-of-Scope as a result of which they intend to increase their student enrollment. Programs awarded a 'Y' category shall first focus on improving their academic quality standards. They can apply for 'Change-of-Scope' for an increase in student enrollment once they are able to move out of 'Y' category to 'W' or 'X' category. A program awarded a 'Z' category is not permitted further intake of students (refer to article 2.14).

1.13 Appeal Cases

In case there are any grievances, the Institute has the right to make an appeal to the NCEAC General Council for review. The decision of the General Council on the appeal will be considered to be final.

1.14 Accreditation Fee

Fee structure of various accreditation visits can be obtained from the NCEAC secretariat or from the official website www.nceac.org.pk.

CHAPTER 2

ACCREDITATION PROCESS

2.1 Introduction

This chapter describes the NCEAC accreditation process. Following steps will facilitate in successfully submitting the Self-Assessment Report (SAR)/ Accreditation Application.

1. Read the NCEAC Accreditation Manual.
2. Visit NCEAC website for any updated information.
3. Communicate with the Council.
4. Appoint/ designate a senior and experienced faculty member to act as focal person during the accreditation process.
5. Plan and fulfil requirements of SAR to successfully submit the accreditation application.
6. Adhere to application filing deadline. It is recommended that re-accreditation application may be submitted at-least three months before expiration date of previous accreditation.
7. Adhere to deadlines while launching new programs.
8. Respond to any queries from NCEAC in a timely manner.

2.2 Online Submission of Self-Assessment Report (SAR)

NCEAC has launched its online Accreditation Automation System (AAS) for accepting SAR/ Accreditation Application of the institute. The AAS is available on the URL <https://accredit.nceac.org.pk>. All institutes are required to submit their SAR/ Accreditation application through AAS. The overall accreditation process is summarized in Figure 1 below:

To proceed, an institute is required to contact NCEAC through e-mail (m.bukhari@hec.gov.pk) for creating login and registration of Institute's Focal Person (FP) in the AAS. Only one Focal Person shall be registered with NCEAC by an institute. The institute for its own purposes may appoint a team for entry of information into AAS, but only one login and password will be provided by NCEAC to the institute for this purpose. The e-mail request for appointment of FP to NCEAC must be submitted by the Dean/ Director/ Registrar or equivalent of the institute.

The following information is required to be submitted in the e-mail request:

- **For University/ Campus:** FP Name, CNIC, Official e-mail, phone number and designation.
- **For Affiliated College/ Institute:** FP Name, CNIC, Official e-mail, phone number, designation and copy of current affiliation letter.

After the registration of Institute's Focal Person (FP), the registered FP will upload and submit SAR/ Accreditation Application through AAS.

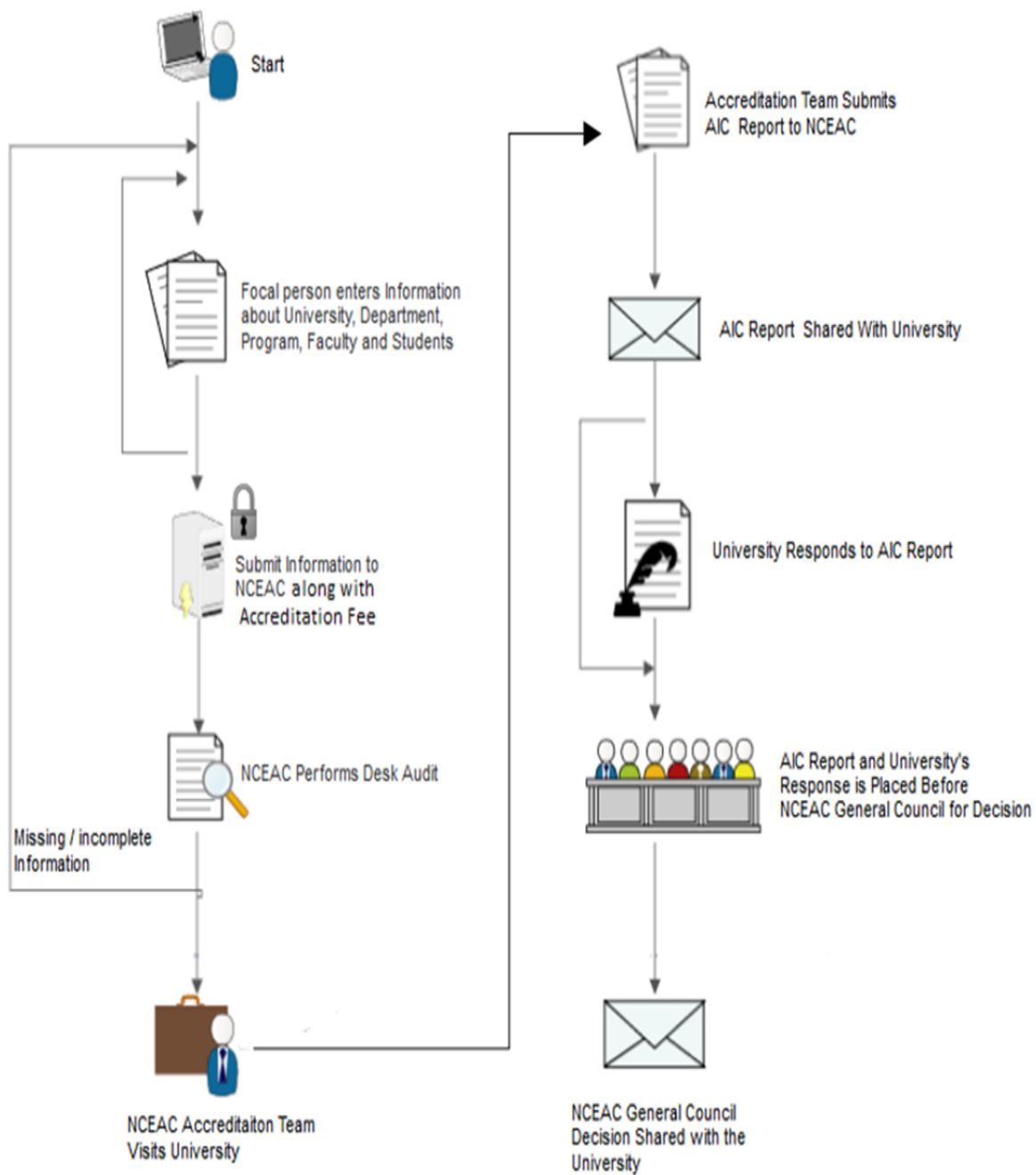


Figure 1: NCEAC Accreditation Process Flow Diagram

2.3 Qualifying Requirements

The qualifying requirements are meant to screen out programs that do not meet the core requirements of the assessment criteria. Failure to meet any one of the qualifying requirements may disqualify the program from further assessment/process. There are five components of the qualifying requirements, and a program is expected to have all the five components. These components are:

- a. Applicant institution must satisfy the legal status/requirement of the relevant bodies, specifying the particular legal arrangements as a Charter/Degree Awarding Institution (DAI), Constituent or Affiliated institution, or any other type.
- b. A minimum of 130 credit hours as per the NCEAC requirements. These 130 credit hours must be offered over a period of four years (8 semesters). The HEC criteria for the semester system must be followed.
- c. Final year project (minimum 6 credit hours).
- d. Full-time computing faculty complying with the standard stated in Chapter 3 of this manual.
- e. Progress on Compliance Report on the last NCEAC-AIC visit observations/General Council decision.

If a program has met all the qualifying requirements, a detailed assessment of the program based on the accreditation criteria as explained in the relevant sections will be carried out.

2.4 Field Audit Visit

The main event in the accreditation process is the field visit which is sometime referred to as Field Audit Visit. A field audit visit is a comprehensive audit conducted by the Accreditation Inspection Committee (AIC) of the program which is seeking accreditation. The AIC report is the major outcome of the visit that is submitted to the Council for evaluation and decision. The report is evaluated by the Accreditation Standard Committee (ASC) to make a final recommendation regarding the accreditation of the program.

Types of field visits are described in Chapter-1. The procedure for conduct of all types of field audit visits is similar.

2.5 Visit Schedule and Date

After Desk audit by NCEAC, Institute proposes multiple possible dates for the visit. NCEAC constitutes AIC as per the approved rules. The date of the visit is finalized after the mutual consent of the AIC members, the institute and NCEAC.

2.6 Composition of AIC

For every visit, NCEAC constitutes an Accreditation Inspection Committee (AIC) to conduct the field visit and evaluate the program under accreditation. The AIC comprises of the Convener and one or two Members along with NCEAC Staff. Credentials of the team members are stated as under:

a. AIC Convener

- Senior and experienced PhD level Program Evaluators are appointed as convener of the AIC. In addition, the AIC Convener is chosen from those who are working in HEC recognized reputed HEI. Normally, an evaluator with PhD in relevant field along with experience of minimum 4 accreditation visits is appointed as convener of AIC.

b. AIC Member

- NCEAC approved Program Evaluator who is serving in HEI and holding a PhD in relevant field with at least 3 years of Post PhD teaching experience are appointed as member of AIC.

c. NCEAC Representative

- If need arises, an NCEAC Representative either from NCEAC Secretariat or from the NCEAC Council or from the Program Evaluators may be added by the approval of the Chair.

2.7 Role of AIC Convener

The Convener of the Visiting Team has the overall responsibility for the accreditation visit. The Convener assigns duties to each team member keeping in view the overall perspective. He/she is familiar with the accreditation process and gathers in advance earlier reports, if any. He/she has the responsibility for the preparation of the consolidated team report and its timely submission for the consideration of the ASC and GC.

2.8 Duration of Visit

Normally, the visiting team requires one or two days on site for field audit visit to complete the evaluation of a program. The duration may be changed by NCEAC depending on the scale of the visit.

2.9 Plan of Activities on the First Day of Visit

The Council has approved a comprehensive plan for a one-day visit to inspect the program under accreditation. NCEAC may, however, increase the duration of the visit to two days to complete the activities outlined for a one-day visit depending upon the scale of the program(s) under accreditation. The AIC can make changes to the order of the activities.

The Convener will hold a pre-visit meeting with members in connection with evaluation of the program, preferably in the evening before the day of the evaluation. The meeting should focus on the points of concern noted by the team members and exchange of views on the provided information/AAS Anomaly Reports, and also the progress made on the observations of previous accreditation visit (if any).

2.9.1 Plan of the Visit

- a. Opening meeting of AIC with senior administration of the institution: Convener will explain aim of the visit and describe the audit process.
- b. Presentation by the Head of the Department of program being evaluated and ensuing discussion. The presentation will cover the following aspects of the

program:

- Program Goals
 - Curricula
 - Faculty
 - Student Strength and Admission Policies
 - Infrastructure
 - Alumni
 - Q/A
- c. AIC meets the faculty members for around 10 minutes per faculty member and confirms the following:
- Academic Credentials
 - Area of Interest
 - Perception about the program, students, and peers
 - Opportunities for professional growth
 - Research opportunities
 - Salary perception
 - Teaching Load
- d. Infrastructure visit by AIC to verify the following:
- Laboratories
 - Library
 - Classrooms
 - Faculty Offices
- e. AIC audits the course folders. If the Institute is maintaining the course folders on LMS/CMS then hard copies are not required to be prepared. PEs will inspect the same on LMS/CMS. Course folders are required to contain the following information:
- Student Attendance Record.
 - Course Information and Teaching Plan.
 - Copies of examinations conducted along with solutions.
 - Record of quizzes and assignments.
 - Overall evaluation policy and award of grades.
 - Projects record and sample hard copies of project reports.
- f. Prayer + Lunch break
- g. AIC visits at least two on going classes for 30 minutes each. It carries out the following activity in each classroom:
- Randomly interviews students and assess their quality and their computing knowledge.
 - It seeks feedback from the students about their perception of the program and quality of teaching.
- h. Filling of Criteria Verification Form (CVF) by AIC. CVF is attached as Annexure “A”.
- i. Exit Meeting.

- AIC shares its findings with the Dean/ Head of Institution without mentioning their recommendations to NCEAC. It briefly describes the strong and weak areas of the program.
 - AIC, if appropriate, gives a general guideline to improve the program.
- j. Post Visit meeting of the AIC members for compilation of Final visit Report.
 - k. Submission of final visit report with recommendations through the AAS for further processing of the Council.

2.10 Responsibility of The Institute during the Accreditation Process

The following are the main responsibilities of the Institute during the accreditation process:

- a. The institution shall arrange an exhibit-room for displaying documents listed in Annexure “B” of this manual.
- b. Ensure availability of teaching staff listed in Self-Assessment Report during AIC visit.
- c. Ensure that all logistic arrangements at the institute (if required) are made.
- d. To coordinate with the convener of the Accreditation Inspection Committee to fulfil any requirements and needs of PEs.
- e. Any other requirements which are communicated to institute by the NCEAC.

In addition to the meeting of AIC with head of the program, faculty and students, following authorities of the institute are expected to be available to AIC team during the field audit visit.

- Head of the Institute (Vice Chancellor/Rector/Director/Principal)
- Dean of the Faculty concerned.
- Chairperson (Head of the Program)
- Director Quality Enhancement Cell or equivalent

2.11 Responsibilities of Institutional Stakeholders

2.11.1 The Institutional Accreditation Committee

The Institutional Accreditation Committee is formed to assist the conduct of Program Evaluation and represent the Institutional stakeholders. It is made-up of the Institutions and is headed by the Head of program or his/her nominee. Its key role is to organize and facilitate all preparations and logistics arrangements before, during and, if necessary, after the Program Accreditation.

2.11.2 Head of Program under accreditation:

The Head of Department has the overall responsibility for the coordination and collaboration of the Institutional stakeholders. Each type of Institutional stakeholders has specific responsibilities. These are presented below:

- a. Share, plan, coordinate and involve all faculty, staff and prospective teachers in the activities and tasks of preparations required for the Accreditation visit.

- b. Facilitate the Institutional Accreditation Committee for all operative and logistic arrangements for the Accreditation visit.
- c. Ensure preparation and availability of documents listed in Annexure “B”.
- d. Ensure the presence of all teachers and support staff.
- e. Ensure appropriate physical conditions and environment in the department.
- f. Coordinate with the Accreditation Inspection Committee to make sure all requirements and needs are met for the Program Evaluation.

2.11.3 Teachers and Support Staff

The key role of both, the teachers and support staff is to provide reliable and truthful information. They will also cooperate and support the Head of Program for any required logistic arrangements.

Their responsibility during the Program Evaluation is to:

- a. Be present in the Institute on Program Evaluation dates.
- b. Be willing to be interviewed.
- c. Be professional while providing information to the AIC team.
- d. Assist the Head of Program in arranging documents for evidence or collection by the Accreditation Inspection Committee.

2.11.4 Presence of Students and Alumni of the Program

The program head is expected to ensure the presence of all students of the program under evaluation. Selected Alumni of the program are also required to be present for interview with the AIC. Necessary arrangements may be done for presence of Alumni and Convener of the AIC may be informed about the time of interview with the Alumni.

2.12 Provision for Withdrawal

The institutions have the option to withdraw its accreditation application for a program during the accreditation process by a written request to the Convener of Accreditation Inspection Committee (AIC), after being informed of its strengths and weaknesses, but before the AIC holds formal discussion among its members for finalizing its report. However, the accreditation visit fee will be non-refunded. The purpose of this provision is to enable institutions to improve the program quality after making the necessary investments and corrections to overcome the indicated weaknesses, rather than be assigned a ‘Not Accredited’ status. The institution can apply again for the accreditation of program(s) being withdrawn together with the prescribed fees.

2.13 Reporting by AIC and Grant of Accreditation

- a. **AIC Report:** At the end of the evaluation visit, the AIC meets the Head of program or Vice Chancellor/Rector to inform him/her about their findings. Subsequently, the committee submits a comprehensive report through the online system. The report is communicated by the NCEAC to the Institute for comments with a deadline for submission of a rejoinder, if required. The comments from the

Institute, if any, and evaluation report are placed on the agenda of the ASC meeting.

- b. **The Role of ASC and GC in the Accreditation Process:** The ASC examines AIC report along with the institution's rejoinder and recommends an accreditation category. ASC recommendations are submitted to the GC for final approval and endorsement to finalize the category of a proposed Program of Institute.

2.14 Accreditation Categories

The GC of NCEAC awards either "W", "X", "Y" or "Z" category to the program based on AIC report. The meaning and implication of each category is explained as under:

- a. Programs awarded "W" Category will be accredited for a period of four years.
- b. Programs awarded "X" Category will be accredited for a period of three years.
- c. Programs awarded "Y" Category will be accredited for **up to** a period of two years. Programs earning two consecutive "Y" categories and qualifying for "Y" category for the third time will be awarded "Z" category.
- d. Program being awarded "Z" category will not be permitted further intake of students. All batches enrolled at the time of AIC visit will, however, be accredited. Such institutes will have to apply for Zero Visit in case they decide to continue their computing programs.

2.15 Zero Visit Recommendation

The AIC, at the time of Zero Visit, will determine whether the facilities provided by the institute are in accordance with the NCEAC Standards for the number of students planned in its annual intake or not. Depending upon the type of deficiencies, the Council may ask the institute to comply with the observations of AIC and apply for confirmatory Zero Visit or ask it to prepare and file a fresh application for new zero after removing the deficiencies.

2.16 Accreditation Letter to the Institute

After decision of the GC, NCEAC issues a letter to the institute specifying the type of accreditation category awarded, any weaknesses and concerns observed as a guideline for the institute to improve itself and prepare for the future accreditation visit.

CHAPTER 3

STANDARDS AND CRITERIA

3.1 Introduction

This chapter describes various standards and requirements for the accreditation of computing programs. As mentioned in previous chapters, the process of the accreditation assures the quality of computing degree programs offered by various universities/DAIs. Therefore, all universities/DAIs who wish to offer computing degree must meet certain defined standards and requirements. The accreditation will be for programmatic and computing programs specific. Moreover, accreditation must not to be confused with a certification. In general, institutions and programs are accredited, and individuals are certified.

3.2 Standards and Criteria

A comprehensive set of standards (given below) have been developed by NCEAC based on Seoul Accord Document D.5, to facilitate institutes to improve the quality of the computing degree programs. The strengths, weaknesses, and concerns of the program regarding these standards are identified during the accreditation process. Each standard is evaluated based on various requirements. The NCEAC expects that each accredited program must fulfil all these requirements as per the Council standards.

The standards criteria are listed below, and their detailed description follows:

- Criterion-1: Program Objectives (POs)
- Criterion-2: Graduate Attributes (GAs)
- Criterion-3: Curriculum and Learning Process
- Criterion-4: Students
- Criterion-5: Faculty and Support Staff
- Criterion-6: Facilities and Infrastructure
- Criterion-7: Institutional Support and Financial Resources
- Criterion-8: Steps to Improve the Program
- Criterion-9: Industrial Linkages

3.2.1 Criterion 1 - Program Objectives (POs)

Program educational objectives (PO) are broad statements that describe what graduates are expected to demonstrate a few years after graduation. It should be ensured that the program objectives are aligned with the vision and mission of the institution.

Program objectives are based on the needs of the program's constituencies and are linked to student outcomes and learning assessment process. The objectives should be clear, concise, realistic and measurable within the context of the committed resources and should define the competitive/unique advantage of the program over similar programs in other peer institutions. A process should be developed to assess the level of attainment of the program objectives to evaluate effectiveness of the academic program.

It should include feedback from employers, alumni, faculty, and other stakeholders. The evaluation results should be utilized for redefining/improving the program objectives.

The program seeking accreditation must demonstrate that the following are in place:

- a. Well-defined and published Program Objectives.
- b. Program's objectives consistency with the Institute's mission.
- c. Program's objectives based on the stakeholder's needs.
- d. A process in place to evaluate the attainment of program objectives.
- e. Evaluation results used for improvement of the program.

3.2.2 Criterion 2 – Graduate Attributes (GAs)

Graduate attributes are statements that describe the set of skills, knowledge, and attitude that institute expects from its graduates. The institute monitors its own performance from the data gathered while evaluating the attainment of GAs by its graduates. By virtue of this data the institute is able to assess the quality of its graduates and take steps to carry out necessary improvements in weak areas that are affecting better attainment of GAs.

GAs defined by NCEAC are in alignment with the Graduate Attributes laid down in the Seoul Accord document D.5 for computing professionals.

The range qualifier in several attribute statements uses the notion of complex computing problem, or the notion of complex activity. These designators are defined in Section 3.2.2.1 and 3.2.2.2 and the full set of graduate attribute definitions is given in Section 3.2.2.3.

3.2.2.1 Definitions Associated with the Graduate Attributes

- a. The **practice area** of a computing professional is defined both by the area of computing knowledge and skills, and by the nature of the activities performed.
- b. A **computing problem** is one that can be solved by the application of computing knowledge, skills, and generic competencies.
- c. **Solution** means an effective proposal for resolving a problem, taking into account all relevant technical, legal, social, cultural, economic, and environmental issues and respecting the need for sustainability.

3.2.2.2 Common Range and Contextual Definitions Associated with the Graduate Attributes

a. Range of Problem Solving

	Characteristic	A Complex Computing Problem is a computing problem having some or all the following characteristics:
1	Range of conflicting	Involves wide-ranging or conflicting technical,

	requirements	computing, and other issues
2	Depth of analysis required	Has no obvious solution, and requires conceptual thinking and innovative analysis to formulate suitable abstract models
3	Depth of knowledge required	A solution requires the use of in-depth computing or domain knowledge and an analytical approach that is based on well-founded principles
4	Familiarity of issues	Involves infrequently encountered issues
5	Level of problem	Is outside problems encompassed by standards and standard practice for professional computing
6	Extent of stakeholder involvement and level of conflicting requirements	Involves diverse groups of stakeholders with widely varying needs
7	Consequences	Has significant consequences in a range of contexts
8	Interdependence	Is a high-level problem possibly including many component parts or subproblems
9	Requirement identification	Identification of a requirement or the cause of a problem is ill defined or unknown

b. Range of Computing Activity

	Characteristic	A Complex Computing Activity is a computing activity or project that has some or all of the following characteristics:
1	Range of resources (people, money, equipment, materials, information, and technologies)	Involves the use of diverse resources
2	Level of interactions	Requires resolution of significant problems arising from interactions among wide-ranging or conflicting technical, computing, contextual, or other issues
3	Innovation	Involves creative use of knowledge of computing or domain principles in novel ways
4	Consequences to society and the environment	Has significant consequences in a range of contexts
5	Familiarity	Can extend beyond previous experiences by applying principles-based approaches

3.2.2.3 Graduate Attributes

GA-1 Academic Education: Completion of an accredited program of study designed to prepare graduates as computing professionals.

Note by NCEAC: Accredited program of study implies a computing program which

fulfills the Higher Education Commission (HEC) National Qualification Framework curriculum requirements. All courses recommended by HEC's National Curriculum Revision Committee (NCRC) will be mapped to this attribute.

GA-2 Knowledge for Solving Computing Problems: Apply knowledge of computing fundamentals, knowledge of a computing specialization, and mathematics, science, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.

GA-3 Problem Analysis: Identify and solve *complex* computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.

GA-4 Design/Development of Solutions: Design and evaluate solutions for *complex* computing problems, and design and evaluate systems, components, or processes that meet specified needs.

GA-5 Modern Tool Usage: Create, select, or adapt and then apply appropriate techniques, resources, and modern computing tools to *complex* computing activities, with an understanding of the limitations.

GA-6 Individual and Teamwork: Function effectively as an individual and as a member or leader of a team in multidisciplinary settings.

GA-7 Communication: Communicate effectively with the computing community about *complex* computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.

GA-8 Computing Professionalism and Society: Understand and assess societal, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice

GA-9 Ethics: Understand and commit to professional ethics, responsibilities, and norms of professional computing practice.

GA-10 Life-long Learning: Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.

In addition to incorporating the graduate attributes (GA-1 to GA-10) listed above as graduate attributes, the educational institution may also include any additional outcomes if adopted.

In particular, the program must demonstrate the following regarding GAs:

- a. Well-defined and published Graduate Attributes
- b. Graduate Attributes linked to the Program Objectives
- c. Mapping of Course Learning Outcomes (CLOs) of all courses to relevant Graduate Attributes.
- d. Teaching-learning and assessment methods appropriate and supportive to

the attainment of Graduate Attributes

- e. Quality of assessment mechanism to evaluate achievement levels for all the Program.
- f. Process in place by which assessment results are applied to further refine the assessment mechanism and/or redefine the Graduate Attributes, thus leading to improvement of the program.

3.2.3 Criterion 3– Curriculum and Learning Process

A curriculum and learning process of the computing program should cover the following essentials:

3.2.3.1 Duration, Content of the Curriculum and Graduation Requirement

- a. The curriculum should comply with HEC guidelines. It should be spread over eight (8) regular semesters (summer semester not being counted). The total degree contents should encompass a course load of 130 credit hours.
- b. One credit hour of theory implies 50 minutes of class contact per week over the duration of the semester and one credit hour of laboratory implies three contact hours of lab work per week spread over the whole semester.
- c. A minimum 2.0 CGPA (Cumulative Grade Point Average) on a scale of 4.0 is required for award of BS/ BSc Computing Degree.

3.2.3.2 Assessment of GAs

Since curriculum courses are mapped to various GAs, the assessment of Course Learning Outcomes (CLOs) provides a direct method of assessment of the relevant GAs.

Course mapping to GAs is done as per the following:

- a. While planning to teach a course, the course instructor proposes a set of Course Learning Outcomes (CLOs) which are usually approved by the department's Board of Studies. In case of multiple offerings of the same course, all offerings of the same course will have same CLOs.
- b. CLOs are then mapped to corresponding Graduate Attribute as outlined in article 3.2.2.3 above. Note one CLO will be mapped to one GA only. However, multiple CLOs may be mapped to the same GA.
- c. A course usually maps to two, three or four GAs. Only FYDP is mapped to more or all GAs.

In particular, the program must demonstrate the following:

3.2.3.3 Lab Work

The teaching/learning in essential subjects must be supported with sufficient practical work in the labs for which each program is expected to have its own

dedicated labs. Laboratories should be designed to involve students in Complex Computing Activity. For this purpose, lab manuals containing all experiments for each course must be maintained. The labs should be well-equipped with the requisite computing equipment/machines such as basic components, modules, measuring instruments, etc.

3.2.3.4 Design Projects

Computing relates to the design of solutions. The students of a computing program must be encouraged to undertake design projects as an integral part of every core subject. Such design projects should be geared towards solving complex problems and complex computing activity.

3.2.3.5 Final Year Design Project

The final-year design project (FYDP) should span over at least two consecutive semesters, that is, semesters 7 and 8, totaling 6 credit hours. It is the capstone of a computing program. Undertaking a final year design project is a compulsory requirement. It should mainly comprise literature search, individual analysis, formulation of a complex problem and its solution through complex computing activity.

The FYDP report shall adhere to the best practices and guidelines of report writing for projects.

3.2.3.6 Internship Program

The program should facilitate and promote cooperative learning through mandatory supervised internship program of continuous 6-8 weeks duration in a professional computing organization. The training program should be planned and agreed upon by both the institution and the host organization. The institution should receive a report about each trainee indicating the training details, interest shown by the student, his/her work habits and punctuality. Assessment of internship program through defined rubrics encompassing respective learning domains shall be demonstrated.

3.2.4 Criterion 4 - Students

The quality of students admitted, and their academic progression are important considerations in evaluating the success of a program in achieving its objectives.

3.2.4.1 Admission Criteria

- a At least 50% marks in Intermediate/ DAE with Mathematics as a subject or equivalent 12 years education with Mathematics as a subject are required for admission in all BS/ BSc Computing Programs except BS/ BSc/ BE Computing Engineering.
- b At least 50% marks in Intermediate Pre-medical (subject combination of Physics, Chemistry and Biology) or equivalent 12 years education are also eligible to apply. Such candidates, if admitted, are required to study additional two Mathematics courses, worth 6 credit hours, during first year of studies at

the institution.

- c At least 60% marks in Intermediate/ DAE with Physics, Mathematics and Chemistry/ CS or equivalent 12 years education with Physics, Mathematics and Chemistry/ CS are required for admission in all BS/ BSc / BE Computing Engineering program.

Note: The determination of equivalence and issuance of equivalent marks certificate up to HSSC level for certificates other than those issued by Pakistan's Boards is the jurisdiction of the Inter Board Committee of Chairmen (IBCC). The following are the addresses of the IBCC offices:

- IBCC at FBISE Building, H-8/4, Islamabad
- IBCC Regional Office at BISE Building, 86 Mozang Road, Lahore.

3.2.4.2 Annual Intake

This aspect pertains to the number of students admitted considering the capacity of the program and its allied facilities through an assessment process. The program intake should be in line with the standards of NCEAC.

3.2.4.3 Transfer of Students

The institute shall develop a clear, documented and well publicized policy on the transfer of students from other institutions. The policy shall take into account evaluation of credit equivalence for the subjects studied in an accredited program of a HEC recognized institution and should be based on justifiable grounds. No more than a maximum of 50% of the total credit hours required for the degree program should be transferred. All such cases of student transfer should be intimated to NCEAC for information and record at the time of acceptance by the institution.

3.2.4.4 Academic Counseling

This aspect pertains to the guidance available to students from teachers through dedicated office hours beyond scheduled timetable. The office hours must be publicized by the instructors by posting them on the office doors/noticeboards. Tutorials, problem-solving and/or help sessions, when planned, should be scheduled, and made a part of the timetable. RAs and TAs / GAs engaged to provide extra coaching and/or subject assistance, especially when assisting the main instructor with a larger class-size, should also maintain specific designated hours for off-class assistance/counseling. Individual students' academic progress should be monitored, and corrective measures taken on a regular basis through well-defined mechanism.

3.2.4.5 Career and Student Wellness Counseling

In addition to the course specific guidance, the institute should have designated student counselors who would advise and counsel students regarding academic as well as career matters. A formal orientation session for the newly admitted students to apprise them about the salient requirements and policies/procedures of the program is highly desired. The student wellness counselor(s) should also provide assistance to students in managing their health, financial, stress, emotional and

spiritual problems.

3.2.4.6 Class Size (Theory)

This aspect pertains to the number of students per section for the theory classes. For all subjects, class size should not exceed 50 students per section. Where the main subject instructor is an experienced PhD faculty and is being duly assisted by appropriate number of GAs/ TAs/ RAs/ LEs for conducting scheduled Tutorials/Help-Sessions and/or with advertised office-hours for off-class guidance of the students, a bigger class size may be justified.

3.2.4.7 Class Size (Practical)

For laboratory sessions, the number of students conducting experiments in the laboratory at one time should be such as to ensure sufficient practical exposure and proper guidance / supervision by the GAs/ TAs/ RAs/ LEs. The number of students per workstation are expected to be limited to 2-3 per workstation; whereas for labs which are demonstrative in nature, relatively larger number of students per workstation may be considered reasonable. An adequate number of GAs/TAs/RAs/LEs and associated staff should be available for effective guidance and help to students during their practical sessions.

3.2.4.8 Semester Academic Load

This aspect pertains to the number of credit-hours taken by students in each semester, and the appropriateness of each subject's workload in consideration of its credit-hours. Students should not be overburdened with workload that may be beyond their ability to cope with or may hamper their assimilation of the subject matter and optimal performance. Academic load in a semester should preferably be in the range of 15 ~18 credit hours as prescribed by HEC.

3.2.4.9 Completion of Courses and Student Feedback

This aspect pertains to the completion of subject contents as published in the official program catalog and/or website. All the subject topics as well as the practical experiments meant to be covered for the course must be completed during the prescribed time. The information will be gathered by the AIC from the official record, as well as through feedback and interaction with students.

The course file is an important instrument to monitor and evaluate the effectiveness of the delivery of the course. A course file must include all relevant data (such as given below) which could become the basis of evaluation.

- a. Course Description including course contents, recommended textbooks, lecture breakdown, office hours for students, Course Learning Outcomes (CLOs) and their mapping to GAs, Assessment tools and their weightage, grading policy etc.
- b. Schedule of quizzes/ mid-term tests and final examination.
- c. Samples of best, worst, and average answer sheets, along with the question paper and model solutions of each sessional(s)/ midterm / quizzes/

assignments and final examination.

- d. Record of make-up classes for any unscheduled holiday.
- e. Breakdown of laboratory experiments pertaining to the course and record of successful conduct.
- f. Record of CLOs assessment and attainment
- g. Instructor course feedback form
- h. Recommendation and suggestions related to the course for the next session.

3.2.4.10 Participation in Competitions

Students' participation in national / international exhibitions and/or competitions not only provides an opportunity to display their projects, exchange ideas and compete with teams from other institutions but also helps to broaden their horizon and provides a platform to the program faculty and administrators to benchmark their program. Winning positions / prizes in such competitions serves to highlight the strong area of the program and builds confidence in the students. Thus, the program should encourage and facilitate participation in such competitions / exhibitions.

3.2.4.11 Student Performance Evaluation

This aspect pertains to the various mechanisms being used for evaluating students' performance in the program courses, and their suitability and affectivity for assessment of the level of achievement of course learning outcomes. This may include a review of various class assignments, quizzes, research reports, examinations as well as lab projects and viva-voce. The number and variety of such assessment tools and their coverage of subject topics in a manner which ensures a reasonably accurate assessment of students' level of achievement against various learning outcomes is the key to monitor students' progress in a direct manner. It is expected that the program should demonstrate a minimum number of such class assignments, quizzes, and examinations for assessment of GAs.

3.2.4.12 Community Service

This aspect pertains to institution's policy and its facilitation to students to carry out various community services.

3.2.5 Criterion 5– Faculty

Faculty requirements is the focus of the accreditation process.

As a general guideline, a faculty member is considered to be relevant to the computing program under accreditation if:

- a his/ her 16 years qualification is in a computing discipline, Or
- b his/ her terminal degree is in a computing discipline, Or
- c his/ her terminal degree is in relevant sciences or engineering and has academic or professional computing experience.

3.2.5.1 Faculty Classification

a. Dedicated/Fulltime

A faculty member is classified as dedicated/ full-time if he / she has been hired as a regular / full-time faculty member for the computing program and carries at least the minimum teaching load in it.

b. Shared

A faculty member is classified as Shared if he/ she is employed full time by the HEI in a program other than the computing program or is employed in the computing program but does not carry the minimum teaching load in it.

c. Visiting

Teachers, who are not employed by the university on full-time basis but are invited from the industry to teach courses in the program under accreditation, are classified as visiting faculty members.

3.2.5.2 Faculty Requirements

Detail about the faculty requirements is given below:

- a. NCEAC requires at least seven dedicated full-time core computing faculty members excluding shared faculty members including at most two full time Demonstrators/ Teaching Fellows/ Teaching Assistants / Junior Lecturers to teach four batches (1st, 2nd, 3rd and 4th year) with each having a maximum of 50 students.
- b. Full-time core computing faculty members must include at least one with a PhD degree and the remaining (excluding demonstrators) must have 18 years or equivalent degree. The Demonstrators/ Teaching Fellows/ Teaching Assistants/ Junior Lectures must have at least 16 years of education.
- c. For a brand-new program under a newly established department, there must be at least Three full-time core computing faculty members (including at the most one demonstrator) at the time of zero visit conducted before the start of the program, including at least one with a PhD degree.
- d. For a new program in an existing department that already offers some computing program(s), the following may be used as a guideline for hiring full-time core computing faculty for a batch of 50 students.
 - 1st year only: Minimum two faculty members including at least one with a PhD degree
 - 1st and 2nd year only: Minimum four faculty members including at least one with a PhD degree and at the most two demonstrators

- 1st, 2nd and 3rd year only: Minimum six faculty members including at least one with a PhD degree and at the most two demonstrators
 - 1st, 2nd, 3rd and 4th year: Minimum seven faculty members including at least one with a PhD degree and at the most two demonstrators
- e. It is further clarified that faculty course load is determined by counting all the courses taught in BS, MS and PhD programs, taught in computing or other departments. The count also includes courses taught in evening or weekend programs.
 - f. Any member of the visiting faculty shall be counted as 0.25 equivalent to full-time faculty member. Maximum permissible cumulative visiting faculty credit is equivalent to one full time faculty member.
 - g. A computing practitioner with 16-years computing degree and minimum 3-years industry experience from a recognized/registered industry may be hired as a visiting faculty.

3.2.5.3 Maximum Load of Faculty

Maximum of 9 credit hours of course load per semester.

3.2.5.4 Minimum Faculty Load

A minimum of 9 credit hours of course load per year is required for Full-Time Faculty. However, minimum 6 credit hours of course load is required from faculty members serving in administrative posts like VC/ Rector/Dean/ Chairpersons/ Directors

3.2.6 Criterion 6—Facilities and Infrastructure

The Council (NCEAC) has defined certain requirements which must be available to the program at the Institute. However, infrastructure is not limited to the requirements given below but university/DAIs can add more to the list.

Classrooms:

- Minimum 3 classrooms per 200 students' batch of 4 sections each of 50 students must be clearly mentioned as the guiding data for the purpose of filling this evaluation form.

Labs:

Following categories of labs will be considered at the time of evaluation:

- General Programming Lab(s)
- Systems Lab(s)
- Hardware Lab(s)

The number of hardware stations available should be 1:3 but 1:5 is also acceptable where students tend to keep laptops.

Library:

- Minimum of 4 computing related books per students should be available **in hard copy**.
- At least 5 photocopies of IEEE/ACM transactions/proceedings should be available in hard copy.
- At least 10 technical Magazines should be available in hard copy.

Other:

- Provision for supporting facilities like transport, hostels, indoor and outdoor sports facilities for male as well as female students, prayer areas, common rooms etc. should also be available.

3.2.7 Criterion 7–Institutional Support and Financial Resources

The institutional support for any degree program is a key to success for the graduates of the program. Therefore, it is expected that the program is supported by the institute through financial and administrative resources for the following purposes:

- To ensure quality and continuity of the program.
- To provide an environment by which student outcomes can be attained.
- To attract, retain, and provide for the continued professional development of a qualified faculty.
- To acquire, maintain, update, and operate infrastructure, facilities and equipment appropriate to the program.

3.2.8 Criterion 8–Steps to Improve Quality

Imparting quality education should be regarded as a significant and long-term component of all activities carried out by HEIs. This requires that a Quality Management Policy must be in place to assure the achievement of Program Objectives and GAs. Planning, implementation, monitoring and improvement are the essential elements of any Quality Management Policy, which provides quality assurance confidence to various stakeholders on the graduates' demonstrable attributes.

3.2.9 Criterion 9–Industrial Linkages

Computing is an applied field in nature, therefore, linkage between the program and industry is an essential requirement. For this purpose, following parameter must be followed by the program seeking accreditation.

- There is an Industrial advisory board/committee.
- There is a formal mechanism for seeking feedback from Industry and its analysis for the attainment of POs.
- There are opportunities for students to acquire industrial experience via internship through the institute's Industry-Liaison office.

- The Design projects are sponsored / supervised jointly by Industry Professionals and faculty members.
- Faculty members are involved in design / supervision / consultancy role with the industry in the execution of applied research / design projects that are relevant to society / industry.

CHAPTER 4

GUIDELINES FOR SELF ASSESSMENT REPORT (SAR)/ ACCREDITATION APPLICATION

4.0 Introduction to SAR/ Application filing on AAS

A Self-Assessment Report (SAR) is an account of the institution's plan, implementation, assessment and evaluation of the program under accreditation. It reflects the processes with results obtained and their analyses used for improvement of quality at all levels of the program's activities. The emphasis shall be on the qualitative description of each aspect and criterion, and how these meet the standards and expectation as set out in this Manual. In other words, this summary document is a form of Self-Assessment by the institution of its computing program.

NCEAC Accreditation Automation System (AAS) provides a convenient platform to apply for accreditation and submit necessary information required in completion of the Self-Assessment Report (SAR) of the program applying for accreditation. This chapter describes the information required in completion of the SAR and accreditation application. This information is uploaded on AAS which will generate a SAR for accreditation purposes in the standardized pdf format. The same would be accessible to the applying institute.

Institutes accessing the NCEAC AAS portal will see the following headings:

- a. **Dashboard**: Statistics of the institute as available with NCEAC from past accreditation visits and the number of applications received from the institute, if any. The dashboard also gives the steps to prepare the SAR/ Accreditation Application.
- b. **Your Profile**: Profile of the Focal Person (FP) nominated by the institute.
- c. **Institute Profile**: It has further subheadings of: General Information, Contact Information and Other Contact Information.

Once this information is provided and saved, the FP will be given access to enter other required data, complete the SAR and Accreditation Application.

On gaining access to other headings, FP for convenience, may fill the data as per the following sequence.

4.0.1 **Department and Programs**: FP has the option to:

- a. View Departments.
- b. Add New Department: Name, date of initiation and category of the department is to be added. In addition, details of the Head of Department are also to be added.
- c. Add new Program:
 - i. Name of program.
 - ii. Type of program.
 - iii. Department offering the program.

- iv. Session information: Whether single or dual intake per year, whether offered in morning and evening shifts, or both.
- v. Total program Credit Hours.
- vi. Program starting date.
- d. View Programs
 - i. View/ Edit Program Objectives (POs)
 - ii. Edit or Add POs.
 - iii. Map POs with Graduate Attributes (GAs). Ten GAs, as required by Seoul Accord, have been incorporated in AAS.

4.0.2 **Faculty Directory:** List of departments added by the FP will be visible. After selecting the required department, FP will be required to add faculty information as stated in AAS.

4.0.3 **Course Catalog:** List of programs added by FP will be visible. On selecting a program, facility to add courses will be accessible. The following information for each course is to be provided:

- a. Course Name.
- b. State the year of HEC's NCRC recommended curriculum being followed.
- c. Course Type. That is whether core, elective or supporting.
- d. Select the Linked HEC NCRC recommended course.
- e. Credit hours of the course.
- f. Select the GAs being mapped to the course. The mapping of Course Learning Outcomes (CLOs) to GAs is decided by the course instructor/ department.

Note: Course mapping to GAs is done as per the following:

- i. *While planning to teach a course, the course instructor proposes a set of Course Learning Outcomes (CLOs) which are usually approved by the department's Board of Studies. In case of multiple offerings of the same course, all offerings of the same course will have same CLOs.*
- ii. *CLOs are then mapped to corresponding Graduate Attribute as outlined in article 3.2.2.3 of Chapter 3 of this manual. Note one CLO will be mapped to one GA only. However, multiple CLOs may be mapped to the same GA.*
- iii. *A course usually maps to two, three or four GAs. Only FYDP is mapped to more or all GAs.*

Note: Theory and lab portions of a course are treated as separate courses.

4.0.4 **Student Directory:**

Note: Refer to Article 3.2.4.1 of this manual for NCEAC admission eligibility criterion and authority to issue equivalent certificates. Institutes are mandated to follow this criterion.

Two options will be visible. One option is whether the students to be added are current students

and the second option is whether the students to be added have already graduated.

4.0.4.1 On selecting “Currently Enrolled Students”, programs entered by the institute become visible. On selecting a program, a button titled “Add new batch/ Entry” will be visible. FP will add the required batch information. After creation of the batch, the FP has the option to upload an excel file in the specified format or add individual students. Data uploaded via excel may have anomalies. Student data with anomalies are shown in “Pending student’s” column on AAS. FP has the option to edit a pending student and make necessary corrections.

Required mandatory fields are:

- Name, Father’s Name, Gender, University Roll/ Registration Number, Date of admission, Nationality, CNIC/ Passport Number, Date of birth, Mailing address, City, HSSC/ DAE nomenclature numeric (1: Intermediate/ DAE with Mathematics, 2: “A” level with Mathematics, 3: Intermediate Pre-medical or equivalent), HSSC/ DAE total marks, HSSC/ DAE obtained marks.

Other fields are optional and may be filled by the institute.

4.0.4.2 On selecting “Graduate Students”, same information is to be filled as outlined in section 4.1.4.1 with additional information of CGPA earned on graduation. A student graduating later than his/her own batch may also be specified in AAS. A submit button must be pressed by FP after entry of the graduating batch information.

4.0.4.3 The FP has the option to change the status of data entered for currently enrolled students to graduated students.

4.0.4.4 The batches entered by the FP at the time of preparation of SAR/ Accreditation Application will be shown as “Pending” until the SAR/ Accreditation Application is submitted by FP to NCEAC. On submission, the status is changed to “Submitted with Application”. After accreditation, status of “Accredited” will be added. On marking Graduated by the FP, the status of “Graduated” will also be visible for the batch.

4.1 SAR/ Application Filing and Processing

- a. On selecting this option, FP will see the list of applications submitted or pending through AAS. An option to select “New Application” will also pop up. FP submitting a new application will select this option.
- b. The program for which accreditation application is to be submitted will be selected by the FP. Programs added in earlier options will become visible.
- c. FP will only be able to choose the type of visit if POs have been added for the program.
- d. In case of choice of Accreditation Visit, mandatory information on the batches for which accreditation is being sought are to be added. Subsequently SAR has to be filled and submitted.

- e. In case of Zero Visit, faculty must be added in Faculty Directory as mentioned in Article 4.0.2. A shortened SAR/ Application must be submitted through AAS where the related criteria in SAR/ Application Filing will be visible to FP for filling and submission.

The general structure of the Self-Assessment Report shall conform to the following sections. The institution is advised to provide accurate information as detailed in Chapter 3 of this Accreditation Manual.

4.2 Program Objectives

- 4.2.1 State the vision and mission of the institution and/or faculty.
- 4.2.2 Describe the process of formulation, improvement and approval of the POs.
- 4.2.3 *The POs have already been entered in the “Departments and Programs” Tab by the FP under “View Programs”. The SAR document generated by AAS will have these POs listed under appropriate head.*
- 4.2.4 Describe how POs are consistent with the vision and mission of the institution and/or faculty and stakeholders’ requirements and state whether they are approved by the institution’s statutory bodies.
- 4.2.5 Describe the processes used to evaluate the achievement of POs.
- 4.2.6 Describe how the results obtained from evaluation are being used to improve the effectiveness of the program.

4.3 Graduate Attributes (GAs)

- 4.3.1 State the university/ HEIs body which has approved the GAs.
- 4.3.2 Describe how the GAs encompass the requirements of Section 3.2.2 of this Manual.
- 4.3.3 Describe the processes used to establish and review the GAs, and the extent to which the program’s various stakeholders are involved in these processes.
- 4.3.4 *The FP has already mapped CLOs to GAs in the “Add new course” option available in AAS under “Course Catalog”. The SAR document generated by AAS will show the mapping of Courses to GAs.*
- 4.3.5 Describe the data gathered and the results of the assessment of GAs.
- 4.3.6 Explain how the assessment results are applied to further develop and improve the program.
- 4.3.7 Describe the materials, including students’ work and evidence of complex engineering problems/ activities, problem-based learning (PBLs), open ended labs (OELs), class projects (CPs), and FYPD that demonstrate achievement of the GAs.
- 4.3.8 Provide information of Complex Problems/Complex Activity exercised particularly in Breadth and Depth courses along with few examples indicating relevant domain(s) towards the attainment of mapped GAs.

Curriculum and Learning Process

- 4.4.1 Describe if the curriculum is in compliance with program specific HEC curriculum guidelines, that is, it is spread over 8 semesters covering at least 130 credit hours of course work. And covers required breadth, depth and content distribution.
- 4.4.2 Describe how does the curriculum provides adequate exposure to Complex Problems (CPs) and design activities.
- 4.4.3 Describe the available program specific well-equipped labs to supplement theoretical knowledge/ classroom learning.
- 4.4.4 Describe how lab work and its assessment mechanism supports attainment of the required skills.
- 4.4.5 State whether Course Learning Outcomes (CLOs) are defined for all courses and are mapped to relevant GAs.
- 4.4.6 Describe if there is any formal involvement of industry in curriculum development / revision.
- 4.4.7 Describe employment of other aspects (supplementary tools and practices) of student learning such as tutorial system and seminar / workshops, etc. to enhance student learning, in addition to regular classroom interaction and lab experimentation. Minimum expectation is that faculty office hours are announced and adhered to.
- 4.4.8 Describe exposure to cooperative learning through supervised and mandatory internship program with formal feedback from the employer.
- 4.4.9 Elaborate if sufficient opportunities to invoke intuitiveness and originality of thought through Problem Based Learning (PBL), Design Projects and Open-Ended labs is provided to the students.
- 4.4.10 Describe how is Assessment of various learning outcomes (GAs/CLOs) employing appropriate direct / indirect methods is carried out.
- 4.4.11 Describe whether the Final Year Design projects (FYDP) include complex problems and design of systems, components or processes integrating core areas and meeting specified religious, cultural and societal aspects.
- 4.4.12 Describe how the FYDP project deliverables and the reports are graded according to well-defined mechanism.

4.5 Students

- 4.5.1 State whether the requirements and process for admission of students to the program and the annual intake are consistent with NCEAC policies.
- 4.5.2 Discuss the policies and processes for credit transfer/ exemption.
- 4.5.3 Discuss mechanism for providing guidance to students on academic, career and aspects pertaining to wellness, student discipline.
- 4.5.4 Describe mechanism and adherence to the policies dealing with harassment and plagiarism cases.

- 4.5.5 Discuss students' workload, class sizes for theory as well as laboratory sessions and completion of courses.
- 4.5.6 Discuss students' activities and involvement in student organizations that provide experience in management and governance, representation in education and related matters and social activities.
- 4.5.7 Discuss Key Performance Indicators (KPIs) to demonstrate students' performance in relation to GAs.

4.6 Faculty and Support Staff

- 4.6.1 Discuss the strength and competencies of the academic staff in covering all areas of the program.
- 4.6.2 Discuss how the overall staff workload enables effective teaching, student-staff interaction, student advising and counseling, institutional service and research activities, professional development and interaction with industry.
- 4.6.3 Discuss processes for faculty development, training and retention.
- 4.6.4 Discuss the sufficiency and competency of technical and administrative staff in providing adequate support to the educational program.
- 4.6.5 *Undergraduate faculty course load information is dynamically generated on AAS from the data provided by the institute in its application. However, FP will link faculty members to courses being taught in Annexure "A". Faculty members teaching Postgraduate course are required to be entered in Annexure "B".*

4.7 Facilities and Infrastructure

The following information is required to be provided on AAS:

- a. Number of dedicated lecture rooms.
- b. Number of shared lecture rooms.
- c. Average size of each lecture room.
- d. Instructional facilities provided in lecture rooms.
- e. Number of computing laboratories.
- f. Average number of computers per laboratory.
- g. Average life of PCs in Computing Labs.
- h. Nature and level of networking.
- i. Specialized lab facilities and hours of their availability.
- j. Student to computer ratio during past three years from the date of accreditation application.
- k. Total number of books in the library.
- l. Total number of unique titles in the library.
- m. State whether library is connected to HEC digital library.

- n. State if there is any Library Management System.
- o. State if there is access to IEEE/ ACM journals in the library.
- p. State the number of computing books and printed technical magazines added to the library in last three years from the date of application.
- q. Reply to other facilities / infrastructure questions listed in the AAS SAR generation facility.
- r. A summary of information on recent improvements and planned improvements in these facilities.

4.8 Institutional Support and Financial Resources

Reply to financial resources and institutional support questions listed in the AAS SAR generation facility for the last five years from the date of application.

4.9 Steps to Improve Quality

4.9.1 Discuss the mechanism for the following:

- a. Program planning.
- b. Curriculum development.
- c. Curriculum and content review.
- d. Responding to feedback and inputs from stakeholders including industry advisors, students and alumni.
- e. Tracking the contribution of individual courses to GAs.
- f. Tracking outcomes of performance through assessment, including rubrics; reviewing of POs and GAs to improve quality.

4.9.2 Discuss the implementation plan based on the observations of the last accreditation visit and the remedial actions taken.

The information required in Sec 4.9.1 -- 4.9.2 should include but is not limited to the following:

- a. Evidence on the participation of faculty members and support staff as well as students in the improvement of the program.
- b. Evidence on the development of academic staff through opportunities in further education, industrial exposure, as well as research and development.
- c. Policies, internal processes and practices that are in place at all levels within the institution relating to the accreditation criteria as stated in Chapter 3 of this Manual.

4.10 Industrial Linkages

4.10.1 Describe the existence of active industry advisory board/ committee and formal involvement of industry in development and review of POs.

4.10.2 Discuss opportunities for collaborative design projects and supervised internship

for students.

4.10.3 Discuss different HEI policies to encourage faculty and students to engage with the industry to have industry-sponsored projects.

4.11 Addendum “B”

- a. FP will link faculty members to courses being taught in this Annexure.
 - *Courses whose CLOs have been mapped to GAs in “Course Catalog” Tab will only be visible. Institutes which have earlier applied to NCEAC for accreditation without CLOs to GAs mapping are required to submit CLOs to GAs mapping by revisiting “Course Catalog” Tab to make course information visible.*
- b. Undergraduate faculty course load information is dynamically generated on AAS only after the FP has completed linking the courses to faculty members.
- c. In addition, courses taught to all sessions under progress during Fall and Spring semesters and names of faculty members teaching these courses are also to be included.

4.12 Addendum “B”

Faculty members teaching Postgraduate courses are required to be entered in Annexure “B”.

Acknowledgment: Pakistan Engineering Council's forms and documents have been used in preparation of this form.

This form is to be used to record program data and information during the fact finding and evaluation process. Use the following compliance levels while filling the form:

G	Good	(Exceeds compliance requirements)
S	Satisfactory	(Compliant)
C	Concern	(Complies with room for improvement)
W	Weakness	(Partially compliant)
D	Deficient	(Not compliant)

Criterion 1 –Program Objectives (POs)

Evaluate the extent to which the program attains the following elements of the criterion.

		Evaluator's Comments	Compliance Level
a.	The institution has defined program objectives (POs) which are consistent with the vision and mission of the institution.		
b.	There is a process in place to evaluate the attainment of POs and the institution has set some Key Performance Indicators (KPIs) for this purpose.		
c.	There is a process in place by which the institution takes steps to review its program considering POs attainment.		
d.	There exists a mechanism that involves alumni, faculty and industry in formulation and review of POs		

Criterion 2 – Graduate Attributes (GAs)

Evaluate the extent to which the program attains the following outcomes of the criterion.

		Evaluator's Comments	Compliance Level
a	Graduate Attributes are clearly defined encompassing attributes outlined in Section D.5 of Seoul Accord Document. These have been adopted by institution's relevant statutory body.		
b	There is a well-defined process for the periodic review and revision of GAs.		

c	The institution has mapped its GAs to the POs of the program.		
d	There is a documented process for the assessment and evaluation of GAs attainment?		

Criterion-3: Curriculum and Learning Process

		Evaluator's Comments	ComplianceLevel
a.	Curriculum is in compliance with program specific HEC curriculum guidelines. It: Is spread over 8 semesters covering at least130 credit hours of course work. And it: Covers required breadth, depth and content distribution.		
b.	Adequate exposure to Complex Problems(CPs) and design activities		
c.	Availability of program specific well-equipped labs to supplement theoretical knowledge/ classroom learning.		
d.	Lab work and its assessment mechanism supports attainment of the required skills.		
e.	Course Learning Outcomes (CLOs) are defined for all courses and are mapped to relevant GAs.		
f.	Formal involvement of industry in curriculum development / revision.		
g.	Employment of other aspects (supplementary tools and practices) of student learning such as tutorial system and seminar / workshops, etc. to enhance student learning, in addition to regular classroom interaction and lab experimentation. Minimum expectation is that faculty office hours are announced and adhered to.		
h	Exposure to cooperative learning through supervised and mandatory internship program with formal feedback from the employer.		
i	Sufficient opportunities to invoke intuitiveness and originality of thought through Problem Based Learning (PBL), Design Projects and Open-Ended labs.		

j	Assessment of various learning outcomes (GAs/CLOs) employing appropriate direct / indirect methods.		
k	Final Year Design projects (FYDP) include complex problems and design of systems, components or processes integrating core areas and meeting specified religious, cultural and societal aspects.		
l.	FYDP project deliverables and the reports are graded according to well-defined mechanism.		

Criterion-4: Students

		Evaluator's Comments	ComplianceLevel
a	Admission Criteria meets / exceeds minimum eligibility criteria prescribed by NCEAC Regulations.		
b	Annual intake is in-line with the maximum intake allowed by NCEAC.		
c	Well documented policy on transfer of students only from other accredited program restricting transfer of less than 50% of credit hours required for the degree.		
d	Availability of designated student counselors to advise / counsel students regarding academic / career matters and provide assistance in managing their health, financial, stress, emotional and spiritual problems.		
e	Manageable class-size (maximum of 50 for theory classes) and lab groups (2-3 students per workstation for hands-on type experiments, larger groups may be manageable for demonstration type)		
f	Manageable semester academic load (i.e. 15-18 credit hours on the average)		
g	Completion of courses as evident from course-files and through student feedback		
h	Students' participation in national / international engineering exhibitions and / or competitions, and facilitation by program for such participations		

i	Quality of process to evaluate student performance and suggest / take corrective measures		
j	How the program is inculcating community services		

Criterion-5: Faculty and Support Staff

		Evaluator's Comments	Compliance Level
a	Faculty Strength as per NCEAC guidelines.		
b	Balanced qualified faculty as specified in NCEAC guidelines.		
c.	Formal mechanism for faculty training and mentoring on pedagogical skills and outcomes based implementation methodologies.		
d	Effectiveness of faculty development program to ensure their professional growth and retention.		
e	Faculty workload as specified in NCEAC guidelines.		
f	Course files maintained as per NCEAC guidelines.		
g	Faculty research, publications and sponsored projects from industry/donor agencies, etc.		
h	Qualified support staff in the program to look after the administrative functions of the program and to look after laboratories.		

Criterion-6: Facilities and Infrastructure

		Evaluator's Comments	Compliance Level
a	Adequacy of teaching and learning facilities, e.g. classroom environment and availability of various teaching aids, etc.		
b	Provision of program specific labs (as per curriculum), workshops, and associated lab equipment for complementing the class / theory work.		

c	Adequacy of library resources and facilities.		
d	Provision of sufficient computing facilities and internet access / resources allocated for the program.		
e	Provision and effectiveness of consulting and career placement services provided to the students		
f	Adequacy of support facilities such as hostels, sports and recreational centers, health care centers, student centers, and transport facilities		
g.	Adequacy of arrangements made / measures taken to ensure work-place safety (EHS concerns) in general, and while performing experiments in the labs. in particular		

Criterion 7: Institutional Support and Financial Resources

		Evaluator's Comments	Compliance Level
a.	Adequacy of institutional financial resources to ensure program's sustainability and meeting of recurring as well as developmental requirements.		
b.	Evidence of continued financial commitment in the form of increasing endowment and recurring / development budget since last accreditation visit.		
c	Provision of funding for R&D pursuits and presentations/publication of research papers		

Criterion 8: Steps to Improve the Program

		Evaluator's Comments	Compliance Level
a.	Documented and institutionalized policies to review POs, GAs and CLOs after every semester/ academic year based on previous years' experience and feedback.		
b.	Actions taken / implementation plans worked out to address the weaknesses identified in the last accreditation visit report.		
c.	Improvement in Faculty Strength / Qualifications since last accreditation visit, if required.		

d.	Continuation of Faculty Publications, R&D and Consultancy activities		
e.	Addition of any new facilities, i.e. infrastructure, lab equipment, teaching aids, etc. to assist in the attainment of program objectives / outcomes, since last accreditation visit		
f.	New initiative(s) taken since last accreditation visit including content delivery, assessment and evaluation processes, etc.)		

Criterion 9: Industrial and International Linkages

		Evaluator's Comments	Compliance Level
a.	Existence of Industrial Advisory Board/Committee		
b.	Formal mechanism for seeking feedback from Industry and its analysis for the attainment of POs		
c.	Opportunities for students to acquire industrial experience via internship and existence of Industry-Liaison office		
d.	Design projects sponsored / supervised jointly by Industry Professionals and faculty members		
e.	Faculty members involved in design / supervision / consultancy role with the industry in the execution of applied research / design project that are relevant to society / Industry.		

DOCUMENTS REQUIRED FROM THE COMPUTING PROGRAM UNDER EVALUATION FOR ACCREDITATION

The following documentation should be available for evaluation by the Inspection Committee

Curriculum Documentation

The respective BS/ BSc program should be documented in the following manner:

- a. Program Objective
- b. Program Structure (Core and Electives) as per HEC National Qualification Framework.
- c. No of Years
- d. Total Credit Hours
- e. Program Requirements-Summary of all required courses
- f. For each course in the program, a single page course requirements as stated below is required:
 - i. Brief Course Outline
 - ii. Structure (Lecture+ Lab)
 - iii. Credit Hours
 - iv. Prerequisite
 - v. Course Learning Outcomes (CLOs)
 - vi. CLOs mapping to Graduate Attributes (GAs)
 - vii. Weekly planner of Lecture/ Lab contents
 - viii. Reference Material (Names, Authors, Publisher, Year, and ISBN for each book used)

Curriculum Implementation/ Course Folder

A COURSE FOLDER/FILE will be required for each course of the respective program. The following information is to be documented in each folder/file:

- a. Course Objectives.
- b. Course Learning Outcomes and mapping to GAs.
- c. Course Contents.
- d. Weekly plan of contents of lectures delivered.
- e. Attendance Record.
- f. List of Reference Material.
- g. Copy of assignments, quizzes, midterms and final examinations.
- h. Solution of all assessments tests given in (g) above.
- i. Three sample graded assignments, quizzes, midterms and final examination securing maximum, minimum and average marks.
- j. Marks distribution and Grading Model.
- k. Comprehensive result of the course
- l. Outcomes Assessment
- m. Detail of technology involved.
- n. Design skills/techniques practiced.
- o. Complete analysis of effectiveness of course and level of skills ensured in:
 - Technology
 - Emerging Development Paradigms
 - Pertaining to Industry
 - Modeling and Design

Curriculum Implementation/ Lab Component

If course has an additional credit hour pertaining to Lab, then an independent folder/file be maintained to provide the following:

- a. Lab Objectives
- b. Course Learning Outcomes and Mapping to GAs
- c. Lab Contents
- d. Weekly plan of contents of lab lectures delivered.
- e. Attendance Record
- f. Copy of laboratory handouts given to students
- g. List of Reference Material
- h. Copy of assignments, quizzes, examinations given in lab
- i. Model solutions of all assessments tests given in lab
- j. Three sample graded assignments, quizzes, and examination securing max, min and average marks
- k. Complete result of the lab
- l. Outcomes Assessment
- m. Detail of technology involved
- n. Design skills/techniques practiced
- o. Complete analysis of effectiveness of lab and level of silks ensured in:
 - Technology
 - Emerging Development Paradigms
 - Pertaining to Industry
- p. Modeling and Design

Effectiveness of Overall Program: Complete analysis of effectiveness of program and summary of level of skills achieved in the following domain:

- a. Technology
- b. Emerging Development Paradigms
- c. Pertaining to Industry
- d. Modeling and Design

Students Evaluation of Course and Instructor: Record of how students have been evaluating both course and instructors in particularly all courses taught by the permanent faculty

Class Schedule: Complete Academic Year

Lab Schedule: Complete Academic Year

Final Year Design/ Graduating Project: Summary of all senior design/graduating projects comprising of the following:

- Scientific areas/applications covered
- Emerging Technologies used
- Correlation with the industrial practices and trends
- Project Reports
- Project Demos

Alumni Data Collection:

- a. Statistics on entry and graduation of all students in the respective program
- b. Record regarding placement in industry of graduates from the respective program
- c. Record of placement of graduates in international and national universities for higher education

Faculty Contracts: A record of offer/contract letters issued to all permanent faculty members

Admission and Eligibility:

- a. Admission procedure/policy and eligibility
- b. Previous data on admission
- c. Student strength and dropout

Annual Budget: A copy of current annual budget

Labs: Complete inventory, schedule and relevant manual of all labs relevant to the respective computing program

Rules & Regulations, Statutes and Procedures: All approved rules & regulation including the following:

- a. Admissions
- b. Registrations
- c. Examinations
- d. Academic probations
- e. Discipline
- f. Faculty hiring, evaluation and promotion
- g. Revision of curriculum

Financial Profile: A survey of total investments made on the program under evaluation since its inception involving:

- a. Human Resource including Faculty Staff, Administrative and Supporting Staff
- b. Office Equipment
- c. Labs/Technology
- d. Infrastructure
- e. Library/Books
- f. Allied facilities

Meetings/Minutes

- a. BOG Meetings/Syndicate Meetings
- b. BOS Meeting
- c. Departmental Meeting