RESTRICTED

Professional Accreditation Handbook For Computer Science Programmes

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CONTENTS

2. CRITERIA FOR THE ACCREDITATION OF COMPUTER SCIENCE DEGREE PROGRAMMES

3. ACCREDITATION SUBMISSIONS

1. FRAMEWORK OF ACCREDITATION

1.1 Introduction

The Hong Kong Institution of Engineers (the HKIE) is the professional engineering learned society and qualifying body for Hong Kong and as such has a responsibility for setting and maintaining the professional and technical standards of its members. To this end, it evaluates the qualifications for admission to grades of Institution membership.

A computer science degree programme accredited by the HKIE shall meet the academic requirements for Member of the HKIE in the Information Discipline. The HKIE's process of accrediting such programmes is called professional accreditation. (A description of professional accreditation is provided in the Appendix.) This handbook sets out the HKIE's processes, mechanisms and criteria for the professional accreditation of computer science degree programmes.

The HKIE does not view the accreditation of degree programmes as discrete and limited exercises, but as part of a process to work with the universities on a continuous basis, to provide help, advice and support, to ensure that the quality of degree programmes is high and meets the needs of professionals, their employers and Hong Kong society in general.

In undertaking accreditation of computer science degree programmes, the HKIE shall seek to establish a mutual recognition agreement with other accrediting authorities in computer science degree programmes like the Washington Accord.

1.2 Accreditation by Faculty

Essentially, the HKIE is concerned with the standards and quality of individual degree programmes. Consequently, it is the individual programme which receives accreditation. However, the process of professional accreditation also considers the appropriate Faculty in terms of its overall philosophy, objectives and resources. This has the advantage of taking into account the broad principles and policies of the development of computer science education in a university.

Furthermore, consideration of a range of programmes has particular advantages in relation to modular programmes and ones containing a number of elective courses.

Although visits will normally be by Faculty, there may be visits to individual departments within a Faculty for the purposes of provisional accreditation, to consider major modifications to a programme or to monitor a programme which had been granted accreditation for less than the normal five years.

1.3 Initiation of Accreditation Exercises

The professional accreditation of computer science degree programmes in the universities is normally initiated by a university issuing an invitation to the HKIE's Accreditation

Committee for Computer Science Programmes to carry out appropriate accreditation exercises.

1.4 Consultation and Accreditation Visits

As mentioned in the introduction, the HKIE sees accreditation exercises as a continuous activity. Accordingly, any university planning new computer science degree programmes, or restructuring existing ones, is encouraged to consult the HKIE in order to ensure that the degree programmes are developed such that the requirements of all concerned are fully addressed.

1.5 Provisional and Full Accreditation

The HKIE undertakes provisional accreditation exercises to consider programmes which have yet to produce the first cohort of graduates, and, full accreditation exercises for the consideration of existing programmes, whether they have been previously accredited or not.

1.6 Accreditation Decisions and the Accreditation Cycle

The HKIE can reach three accreditation decisions (section 1.11 also refers) as follows:

1.6.1 Provisional Accreditation

Provisional accreditation may be granted to developing programmes, and generally the relevant accreditation exercises will be completed during the second-half of the programme of the first cohort of graduates. Provisional accreditation provides an indication to both the university and prospective students that the programme is well structured and has very good possibilities of receiving full accreditation but should not be construed as a commitment to the granting of full accreditation.

1.6.2 Accreditation for a Period of up to Five Years

The HKIE may grant full accreditation for the normal cycle of accreditation of five years. Alternatively, the HKIE may grant full accreditation for a term of less than five years, either to bring it in line with the accreditation cycle of other programmes or to monitor a programme early in relation to any conditions, requirements and/or concerns which may have emerged during the accreditation process.

For a newly developed programme, a full accreditation exercise is mounted, at a time agreed with the university, after the first cohort of graduates. Full accreditation, if granted, will be retrospective so as to

apply to the first cohort of graduates.

1.6.3 Accreditation Refused or Withdrawn

If a programme is substantially at variance with the HKIE criteria (see section 2), then the accreditation can be refused or withdrawn.

1.7 The Accreditation Panel

The HKIE has an Accreditation Panel (not to be confused with visiting teams) which is a group of appropriately qualified experts, selected by the HKIE's Accreditation Committee for Computer Science Programmes, to participate in professional accreditation exercises, on behalf of the HKIE.

In addition, experts from overseas, with appropriate expertise are invited by the Accreditation Committee for Computer Science Programmes to be included on the Panel.

1.8 Visiting Teams

Visiting teams shall normally be selected from the Panel for each particular accreditation exercise. The Dean or Head of department shall be informed of the names of the proposed chairman and members of a team, and objection to a team member may be made if there is a conflict of interest. (Team members are selected on the basis that they have no professional or any other association with the university, nor members of their family attending it.)

1.8.1 Team Size and Constitution

For a single discipline exercise, the team shall normally comprise four members including the chairman. All members shall be experienced in the discipline, or associated with it. For exercises involving two or more programmes, which may cover several computing disciplines, there shall be at least two members from, or associated with, each of the disciplines.

The accreditation visiting team shall have a good mix of academics and non-academics. Whenever possible, members of the Accreditation Committee for Computer Science Programmes shall be invited to participate in the visits. In addition, the HKIE secretariat staff shall accompany the visiting team.

In general, to ensure continuity and expertise, team chairmen shall have considerable previous experience of professional accreditation, and, most members of the team will be expected to have knowledge and experience of professional accreditation.

1.9 Accreditation Visits

Accreditation visits are an important part of an accreditation exercise. They enable the HKIE to assess, at first hand, qualitative factors, such as facilities, intellectual environment, morale, professional attitudes and the quality of staff and students.

For programmes which are being planned by a university, the HKIE will arrange consultation visits by experts as appropriate in each case. On such visits, the experts shall only comment and advise on the proposed programmes and shall not commit the HKIE to granting accreditation to a programme.

It should be noted that the accreditation visits are only a part of the full accreditation exercises. There is considerable preparation prior to a visit and many post visit activities.

A visit will normally take one and a half days and shall include:

- meetings of the team with the appropriate senior university staff;
- meetings with the programme leader and other academic staff;
- meetings with the students and support staff;
- visit to the departmental facilities, including lecture theatres, laboratories, library and computing facilities;
- review of examination papers, laboratory instructions and reports, project reports and other material demonstrating student performance;
- private meetings of the team; and
- an exit meeting with the Dean and senior staff to convey the team's initial observations.

1.10 Accreditation Reports

Based on a consensus of opinion, ascertained at the end of a visit, the team chairman, with the assistance of the HKIE secretariat, shall draft a formal report based on the observations of the team, and assess whether the programme conforms to the HKIE Accreditation Criteria.

Notes: The following procedures have been adopted formally by the Accreditation Committee for Computer Science Programmes in dealing with the Accreditation Report.

(i) The visiting team chairman will draft the report with the assistance of members of the team and the HKIE staff.
(ii) The draft report will be sent to the visiting team members for comment.
(iii) The comments made by the members of the visiting team will be considered by the chairman.
(iv) The draft report will then become the final report.
(v) The final report will be sent to the Dean and relevant Heads of Departments for comment.
(vi) The comments made by the Dean and Heads will be sent to the visiting team

chairman and the assessor.

(vii) The final report, and the comments made by the Dean and Heads will go to the Accreditation Committee for Computer Science Programmes at the decision meeting.

The report, in the first instance, shall be discussed with the Dean or Head of department to ensure that there is no error of fact or omission. The draft, corrected if necessary, shall then be circulated to the team members for comment.

A copy of the final report shall be sent, by the HKIE secretariat, to the university for information (see Section 1.11). The university may make a formal response if it so desires.

The HKIE maintains strict confidentiality regarding accreditation matters. It is for the university to decide how information related to this accreditation should be released and may inform HKIE accordingly.

1.11 Accreditation Decisions

In advance of the accreditation visit, the Accreditation Committee for Computer Science Programmes will appoint one of its members, who can join the visit as an observer, to act as an assessor. The assessor will study all the documentation and, in consultation with the visiting team chairman, make recommendations to the Committee for an accreditation decision. The Chairman of the Committee will initiate the discussion on the programme under consideration.

The accreditation report and university responses, and all other relevant information and correspondence will be passed to the Committee for a decision.

The representatives of the university concerned, usually the Dean and/or Head of Department may attend that part of Committee meeting devoted to the presentation of the report. Members of the visiting team may also be present.

At the meeting, the visiting team chairman will present the report and representatives of the university may put forward further information and answer questions of fact. The Committee will then conduct a private meeting from which University representatives are excused. The assessor will present recommendations. The Committee may then take one of the following decisions (section 1.6 refers):

a. that the programme be fully accredited for a term of up to five years with or without conditions; or

b. that the programme be granted provisional accreditation with or without conditions; or

c. that the programme not be granted accreditation; or

d. that the accreditation of the programme be terminated.

The Secretary to the Committee will write to inform the university of the decision with a copy of the final report, in confidence, to the university Vice Chancellor/President/Director, copied to the relevant Dean and Head of department.

1.12 Costs

Any university wishing its computer science programmes to be accredited by the HKIE shall pay an accreditation fee on each visit. The accreditation fee charged per visit is to be determined by the Accreditation Committee for Computer Science Programmes on agreement with the academic institutions concerned.

The direct costs of each accreditation exercise (travel, subsistence, accommodation) will be paid by the university concerned.

1.13 Confidentiality

All documents and other information obtained by the Accreditation Committee for Computer Science Programmes during the course of an exercise are kept confidential.

1.14 Appeal Procedures

In the event of a decision by the Accreditation Committee for Computer Science Programmes to refuse or terminate accreditation of a degree programme, the university concerned has the right to appeal to the Accreditation Board to review the decision.

2. CRITERIA FOR THE ACCREDITATION OF COMPUTER SCIENCE DEGREE PROGRAMMES

2.1 Introduction

The HKIE acts as the accrediting authority to evaluate the standard and quality of computer science programmes. In doing so, it takes into account a number of factors about the programmes and the universities which offer them. The quality of a computer science programme depends on more than just the curriculum and syllabus. The calibre of the academic staff, the entry standards, staffing levels, teaching methods, facilities, funding and method of assessment are just some of the factors which influence the quality of the educational experience.

The following describes criteria which will be used in assessing computer science programmes. In setting them out, the HKIE considers it important for universities to provide an environment which can accommodate innovative educational development. They also allow for the strengths, qualities and ideals of individual universities.

2.2 Standards

In undertaking accreditation, the HKIE aims to meet internationally recognized standards by adopting best practices.

2.3 Aims and Objectives

In submissions for the accreditation of computer science degree programme(s), a university must be able to express the aims, objectives and ethos of the programme(s). The university must demonstrate how it meets the aims and objectives and how these can be developed in response to future advances in computer science.

Computer science programmes evolve with technology and with the changing needs of society. Consequently, a university would be expected to be able to accommodate such development in terms of how the structure and rationale of its programmes can respond to change.

2.4 Duration

Computer science programmes should have a minimum duration of three years full-time equivalent, of which a one-year full time equivalent consists normally of about 26 weeks of classroom, laboratory, workshop and related activities. (Time allocated to assessment and practical training is excluded from these 26 weeks.)

2.5 Part-time Degree Programme

A part-time programme should meet all the requirements of full time programmes.

2.6 Syllabus and Curriculum

Computer science programmes fall within the domain of information science and computer technology, and is defined as:-

Definition

Computer Science is a discipline which applies appropriate scientific principles and technological advances to the design and utilization of computing techniques and computer systems to solve practical problems. The scope includes fundamentals of computation (such as algorithms and data structures), computer components (such as processors, networks and operating systems) and applications (such as software, data base and data communication systems). It also involves specification, design, development, construction, testing, maintenance, and quality assurance of computing techniques and systems. In addition, Computer Science addresses issues which are pertinent to computing techniques and computer systems, such as safety, cost effectiveness, efficiency, reliability, user-friendliness and ethics.

It is not desirable to state precisely the content of courses in computer science programmes. However, the curriculum for a computer science programme is expected to have three main components, namely, mathematics, science and engineering subjects pertinent to computing, and complementary electives.

The list of topics within each subject area is only indicative of possible content. It is important to note that all courses must be taught to strengthen problem solving skills, to emphasize design principles, or to apply the underlying fundamentals of computation to relevant applications.

2.6.1 Mathematics

The mathematics content of computer science degrees should underpin the scientific subjects and should emphasize concepts, principles and their applications to problem solving. It is accepted that these can be delivered as separate topics. However, the accrediting authority believes that it is also desirable for mathematics to be delivered within the context of its applications to computing techniques and computer systems and be within the scientific subjects of the programme.

Underpinning Mathematics

- Discrete Mathematics
- Probability and Statistics
- Logic

2.6.2 Science and Engineering Subjects

A computer science programme should include subjects which require:-

(i) the students to obtain a high level of proficiency and a practical knowledge of the science and technology of computing such as design of algorithms and fundamentals of computation;

(ii) the application of scientific, engineering and mathematical principles to the analysis and solutions of problems;

(iii) an emphasis in design and synthesis which should be taught in the context of design philosophy and technology as well as financial, quality, and security implications.

Projects

Projects are an important means of helping students to develop a professional approach to the use of computer systems and computing techniques to solve practical problems. For this reason, the use of projects as a vehicle for the integration of subject areas is strongly recommended throughout the course. Normally, the final year of the computer science programme should include an intellectually challenging project which is individually assessed. The project should pull together the many strands of the programme, particularly addressing design, synthesis, application, and creativity. The assessment of the project should be a significant factor in the final award.

Within a three-year programme, normally 60% of the content should comprise science and engineering subjects. Sample subjects include, but not limited to the following :-

Fundamentals of Computation

- Algorithm design and analysis
- Data structures
- Complexity and computability

Computer Systems

- Computer organization and architecture
- Communications and networking
- Distributed and parallel systems

Data and Knowledge Bases

- Representation, modelling and processing of data
- Database management
- Information retrieval

Software Systems and Software Engineering

- Programming languages, compilation, and operating systems
- Program design and development
- Software design and specification methods
- Group design and implementation

2.6.3 Complementary Electives

Electives shall include studies which provide students with an appreciation of relevant issues and enable them to become competent computer professionals. Electives shall provide students with both broad background knowledge and technological specifics. Sample subjects include, but not limited to the following:-

- Human computer interaction
- Graphics and multimedia systems
- Machine intelligence
- Business and economics
- Project management
- Design for usability and re-use
- Evaluation of technical, economical and other trade-offs
- Techniques for testing and quality assurance
- Quality standards, reliability, and safety
- Professional ethics

In addition we believe the following elements are very important and should form part of the electives.

(a) Training through work experience

The benefits of practical experience obtained during a computer science programme are recognized and students are encouraged to aggregate significant, relevant training or employment. This will normally be obtained during summer and winter vacations, and universities should encourage this activity.

(b) Communications

It is essential for students of computer science programmes to have good communication skills. Computer science programmes should contain instruction in the art and practice of communication in spoken and written English. It is desirable that oral reports are included in the assessment.

The university should produce evidence that the department concerned gives adequate attention to communications.

(c) The role of computer and IT professionals

Students are expected to be familiar with the role of professionals in practice and their responsibilities towards the profession, colleagues, employees, clients and the public, particularly with reference to the impact of technology on society. Furthermore, they should be made aware of the role of professional institutions and matters of professional practice such as professional qualification and registration.

Within a three-year programme, the electives excluding training, should comprise at least 20% of the programme.

2.7 Academic Staff

An important factor in determining the outcome in a computer science programme is the quality and commitment of the teaching staff. A significant proportion of the academic staff responsible for delivering such a programme should be able to demonstrate academic attainment and achievement. In addition, their professional standing as academics and, where relevant, as members of relevant professional bodies should be demonstrable.

An appropriate proportion of the staff should have postgraduate degrees by research, and they should be involved in appropriate scholarly activities.

The required number of academic staff depends upon a number of factors:

- the number of courses including servicing courses, together with their content and duration;
- the number of undergraduate and postgraduate students;
- the expertise required to teach the range of courses provided;
- the provision of small tutorial and design groups.

The majority of staff should be full-time employees of the university, although a certain number of practicing professionals from industry, employed on a part-time basis can make a special contribution to the delivery of courses. Consequently, it is recommended that practicing professionals be invited to take part in the education of the students through formal and informal lectures, involvement in design projects and/or acting as industrial tutors.

The student/staff ratio should be sufficient for the appropriate delivery of courses and at no time should a programme become critically dependent on one individual.

A computer science programme also requires input from other professionals, particularly in the areas of mathematics, basic and applied sciences and the humanities, and the quality of such staff should be commensurate with that of the computer science staff.

2.8 Resources

A computer science programme relies on an adequate provision of support staff, administration, laboratories, information services, computer facilities, finance and other resources and there should be an adequate provision of:

2.8.1 Support Staff

There should be sufficient technicians and workshop staff to ensure the smooth and safe management of laboratories, maintenance of equipment and general support.

Administrative and secretarial staff should be sufficient to aid the academic staff.

2.8.2 Accommodation and Equipment

There must be adequate provision of lecture rooms, laboratories, workshops and private study areas to support the programme of lectures, tutorials and laboratory sessions. Laboratories should be well equipped with adequate and modern equipment and should provide a safe working environment for the students.

2.8.3 Computer Facilities

Computer facilities should be consistent with the aims of the programme. Students should have easy and adequate access to such facilities.

2.8.4 Information Services

The university should be able to provide adequate resources for reference and information, making use of conventional and latest methods and facilities, including books, journals tapes, films, disks and databases.

Regarding conventional library facilities, these should provide a range and variety of technical and non-technical books, and a comprehensive range of journals covering all information system science and technology disciplines. The inter-library loan system should be available to all students, together with abstract and literature search facilities for project work. Students should have easy and adequate access to these facilities.

2.8.5 Finance

This should be adequate to ensure efficient and effective administration of a computer science programme and the provision and maintenance of laboratory, computer libraries and other support facilities.

2.9 Assessment

Performance of students in examinations, laboratory work, design studies and projects should reflect part of the outcome of the learning process and the quality of teaching.

An independent quality assurance process such as the independent external examiner system or equivalent is essential to maintain the academic standards of programmes.

2.10 Entry Levels

There is no prescribed minimum qualification for entry to computer science degree programmes, but it is expected that the selection criteria are such that the majority of students will be able to complete the programme at the expected standard. While a broadening of subjects studies prior to a degree can be beneficial, for entry to computer science degree programmes, the accrediting authority considers it crucial that a student demonstrates competence in the subjects of Mathematics, Computer Science and other relevant subjects.

A computer science programme should attract a high proportion of able students, but this should not preclude a university from selecting well-motivated students with unusual qualifications, using careful and appropriate procedures.

Selection procedures which are not generally accepted must be justified by the university.

2.11 Development

It is incumbent on an academic institution to be sensitive to the requirements of society and the profession, and consequently, to develop programmes to respond to local and international requirements and to provide opportunities for staff to be able to develop their skills so that they can deliver programmes meeting local and international professional and academic standards. In order to do this, universities have a responsibility to liaise with the profession and industry in relation to computer science degree programmes and their development.

2.12 Programme Amendments

It is expected that from time to time there will be evolutionary changes to a programme within the period of its accreditation. Any modifications to a programme should maintain the spirit of the programme as accredited and may include such changes as:

- a change in the title of the programme
- a change in the length of the programme;
- the addition of options and/or streams;
- a significant reduction in the provision of resources for the programme.

The university should inform the accrediting authority of major curriculum change. Subsequent actions, including initiation of a visit or request of a written report may then be considered.

3. ACCREDITATION SUBMISSIONS

When preparing a submission for professional accreditation, the university is advised to consider the criteria in section 2 carefully, and to consult the HKIE as appropriate.

3.1 Provisional or Full Accreditation

The following information and details which are requested relate both to provisional and full accreditation submissions. However, 'historical' information is obviously not relevant to provisional accreditation.

For the provisional accreditation of developing programmes the exercises should commence at least six months before the first cohort of graduates has reached the half way stage of the programme, at which time a university should provide the preliminary details (section 3.2).

For the full accreditation of existing programmes, a university should submit the preliminary details no later than six months before the expiry of the current approval.

For the full accreditation of developing programmes the exercises may commence at a date, mutually acceptable to the HKIE and the university, after the first cohort of graduates have emerged. The preliminary details should be submitted no later than six months before the visit.

In both cases, the full information requested (section 3.3) should be submitted at least six weeks before the date of any visit. If as a result of considering the submission further information is required, the chairman of the HKIE Accreditation Committee for Computer Science Programmes, in consultation with the chairman of the visiting team and the university may arrange to delay the timing of any visit or, in exceptional circumstances the cancellation of the exercises.

3.2 Preliminary Details

A university seeking accreditation of a programme is required to submit the following introductory information:

1. title of the Faculty or department;

2. Dean, Head of department, names, qualifications and date of appointments;

3. title of the programme;

4. name of programme leader;

5. accreditation sought (provisional or full);

6. brief resume, 100 words maximum, about the programme submitted;

7. provisional dates for the visit.

3.3 Full Information

The following details and documents are to be provided at least six weeks before the date of a visit:

1. if relevant, changes made to the programme since any last visit. (If accredited by another professional body, the HKIE should have an opportunity of receiving the appropriate reports);

2. details of self validation procedures;

3. details of administrative and authoritative structure of the university and Faculty, indicating who holds ultimate responsibility for the programme;

4. the programme philosophy;

5. duration of programme in full-time equivalent and actual years, and in weeks per annum;

6. allocation of students' weekly work load in hours between lectures, tutorials, laboratory, project, etc, for each year of the programme;

7. details of the curriculum listing each course and subject and giving for each subject the time-tabled hours per week for lectures, tutorials, and practical work, the total hours per week and per year. These details should be given for each year of the programme;

8. details of the programme including the following:

    a. syllabuses;

    b. objectives of each individual course;

    c. hours allocated to each topic listed in the content;

    d. practical experiments, drawings, fieldwork, or other practical work in relation to the syllabus;

    e. lists of essential and reference text-books;

9. details of the student admission procedures including the following:

a. minimum entry requirements (including examples of advanced standing, if any);

b. selection criteria;

c. number of students admitted to the programme year by year;

d. entry qualifications of students;

10. details of assessment procedures for syllabuses and for the programme as a whole, including the assessment methods and attrition rate, plus the following:

a. the marks, credits or weighting for each subject and the percentage of these allocated to written examination, practical project, and continuous assessment elements of the total marks for the subject;

b. final examination results for the past five years, or since commencement, including the distribution of honours classifications;

c. number and duration of examinations and/or practical tests for examinations in each subject;

d. the conditions which permit a candidate to advance from one stage to the next;

e. the basis on which candidates are permitted to repeat failed subjects and to carry exemptions in other passed subjects;

11. details of external examination, or similar monitoring;

12. details of the teaching and support staff, including the following:

a. academic staff with curriculum vitae for each member listing the name, position, qualifications, membership of professional bodies, experience, research and consultancy activity and list of publications;

b. technical, laboratory and other support staff with details of the names, qualifications and experience;

13. details of lecture halls, laboratories, workshops, and other work areas available for the programme, listing the floor area, number of student places and equipment;

14. information services and, in particular, library facilities;

15. computer facilities available for the programme;

16. graduate employment statistics;

17. external professional contact by the staff and students;

18. funding of the department, for equipment and research;

19. future plans, budgets and intentions for the programme;

20. evidence of practical training undertaken by the students;

21. process for ensuring continuing development of staff and programme;

22. other information which the Department or Faculty may wish to supply regarding the environment for the programme.

3.4 Information to be Available During the Visit

The following material is to be made available during the accreditation visit:

1. examination question papers, specimen solutions for the last three normal examinations in each course;

2. marked examination scripts for the most recent examination in each course. For large classes the selection supplied should be representative of the range of marks;

3. course material supplied to students: course outlines, tutorial sheets, laboratory experiment instruction sheets, prescribed texts, notes etc;

4. examples of final year design, laboratory and other projects representative of the range of topics covered and the markings.

APPENDIX

NOMENCLATURE

Academic Accreditation
Any evaluation or assessment to determine whether the academic standards of an institution of higher education are comparable with internationally recognised standards. It includes course validation, course revalidation, institutional review and institutional accreditation.

Professional Accreditation
The evaluation and comparison of the academic standards of a degree or sub-degree and consideration of the appropriateness of the education component of that degree or sub-degree for professional practice.

The Accreditation Panel
Those Members of the Institution who are appointed to carry out professional accreditation visits on behalf of the HKIE.

The Accreditation Exercise
The full professional accreditation process.

The Accreditation Visit
A visit to an academic institution as an integral part of the professional accreditation exercise.

The Visiting Team
Members of the Accreditation Panel selected to carry out a specific accreditation exercise.

Programme
Refers to the complete curriculum of a degree, comprising courses/modules/credit units, assignments, workshops, projects and so on.

Course
Refers to a specific taught part of a degree programme (course is sometimes used to describe a whole degree programme, where that programme has a fixed curriculum). Courses are sometimes referred to as subjects, modules or credit units.

Supplement

In addition to the criteria for the accreditation of computer science degree programmes mentioned in Section 2 of the Accreditation Handbook for Computer Science Programmes, the Accreditation Committee for Computer Science Programmes agreed that the following elements would also be taken into consideration by the Visiting Team Members in conducting an accreditation visit to computer science programmes:-

1. **Basic Tools**
   A computer/software engineer must be able to make use of basic tools for their daily work, such as computer graphics tools, database, mathematical tools and word processing. These should also include computer system installation, simple networking, and information retrieval, transmission, and presentation using web tools and search engines, etc.

2. **Design**
   Sufficient design elements should be defined clearly in most subjects at senior levels, and examples should be available upon request.

   Furthermore, subjects/topics related to modeling and design of computer-based systems are recommended since they can be used to demonstrate comprehension of the tradeoff involved in design choices.

3. **Software Engineering**
   This element is indispensable in a computer science programme. The stress is not so much on the theoretical side of software engineering, but more on the understanding and application of good practices and tools, in areas including the design and integration of large software, software modeling and analysis, verification and validation, quality assurance, software maintenance, documentation and safety, software and project management, etc. .

4. **Society and Engineers**
   A subject should be offered related to “Society and Engineers”, contents of which include professionalism, responsibilities, ethics, security, legal aspects, etc.

5. **Mathematics**
   Sufficient mathematics contents should be included in a computer science programme. The actual contents and percentage of mathematics are left to course designers. It is recommended that 16% be used as a reference, and significant deviation is not expected.

6. **Modernization**
   Computer science programmes should be sufficiently modern; contemporary subjects/topics such as web programming, UML (unified modeling language), object-oriented design and programming, information security, etc. should be included whenever they are appropriate.

7. **Language/Communication Skills**
   Computer science/information programmes should emphasize oral and written communication skills training as graduates from these courses normally need to spend much

time to make presentations and read/write manuals or instructions for the purpose of communication with other people or in a teamwork environment.

8. **Project Work**
Final year projects or capstone projects are indispensable in a computer science/information programme to be recognized by the HKIE.

9. **Consistency in Course Design**
The HKIE should not be overly prescriptive in curriculum design, but courses must be designed with a consistent, systematic and comprehensive philosophy. Course leaders must prepare to defend their course structures and design methodology during accreditation exercises.

10. **Examples of "Core Contents" in a Computer Science Programme**
Computer Science covers a broad discipline. The actual contents of a programme are left to course designers. The following gives a list of possible core contents for the sake of reference. It is expected that many of these items be included in a computer science programme seeking for accreditation.

DS. Discrete Structures
DS1. Functions, relations and sets
DS2. Basic logic
DS3. Proof techniques
DS4. Basics of counting
DS5. Graphs and trees
DS6. Discrete probability

PF. Programming Fundamentals
PF1. Fundamental programming constructs
PF2. Algorithms and problem-solving
PF3. Fundamental data structures
PF4. Recursion
PF5. Event-driven programming

AL. Algorithms and Complexity
AL1. Basic algorithmic analysis
AL2. Algorithmic strategies
AL3. Fundamental computing algorithms
AL4. Distributed algorithms
AL5. Basic computability

AR. Architecture and Organization
AR1. Digital logic and digital systems
AR2. Machine level representation of data
AR3. Assembly level machine organization
AR4. Memory system organization and architecture
AR5. Interfacing and communication

AR6. Functional organization
AR7. Multiprocessing and alternative architectures

OS. Operating Systems
OS1. Overview of operating systems
OS2. Operating system principles
OS3. Concurrency
OS4. Scheduling and dispatch
OS5. Memory management

NC. Net-Centric Computing
NC1. Introduction to net-centric computing
NC2. Communication and networking
NC3. Network security
NC4. The web as an example of client-server computing

PL. Programming Languages
PL1. Overview of programming languages
PL2. Virtual machines
PL3. Introduction to language translation
PL4. Declarations and types
PL5. Abstraction mechanisms
PL6. Object-oriented programming

HC. Human-Computer Interaction
HC1. Foundations of human-computer interaction
HC2. Building a simple graphical user interface

GV. Graphics and Visual Computing
GV1. Fundamental techniques in graphics
GV2. Graphic systems

IS. Intelligent Systems
IS1. Fundamental issues in intelligent systems
IS2. Search and constraint satisfaction
IS3. Knowledge representation and reasoning

IM. Information Management
IM1. Information models and systems
IM2. Database systems
IM3. Data modeling

SP. Social and Professional Issues
SP1. History of computing
SP2. Social context of computing
SP3. Methods and tools of analysis
SP4. Professional and ethical responsibilities

SP5. Risks and liabilities of computer-based systems
SP6. Intellectual property
SP7. Privacy and civil liberties

SE. Software Engineering
SE1. Software design
SE2. Using APIs
SE3. Software tools and environments
SE4. Software processes
SE5. Software requirements and specifications
SE6. Software validation
SE7. Software evolution
SE8. Software project management