



ICM

Professional Computing & Information Processing

Course Handbook



SETTING GLOBAL STANDARDS

For Business & Management Education

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The Institute of Commercial Management

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1 Introduction

The purpose of this Course Handbook is to provide you with general information about studying with the Institute of Commercial Management (ICM). This Handbook should be read in conjunction with other Guidelines available on the ICM website. The early pages of this Handbook provide general information about ICM and its programmes. Later sections give details about the equivalency of ICM Certificate (NQF* Level 4 qualifications), Diploma (NQF Level 5 qualifications), Advanced Diploma (NQF Level 6 qualifications), Graduate Diploma (NQF Level 6 qualifications) and Post Graduate Diploma Awards (NQF Level 7 qualifications). Please note that not all Levels are available for all programmes. The material in this Handbook is as accurate as possible at the time of production.

*NQF: the UK National Qualifications Framework

2 The Institute of Commercial Management (ICM)

Established in the early 1970s, the Institute of Commercial Management provides academic and vocational qualifications which are well recognised globally.

In its capacity as a course developer and an examining and certifying Board, the Institute offers a wide range of professional and vocational awards in Business, Management and related vocational areas.

ICM programmes are designed to address the personal development and training needs of those wishing to enter the commercial sector and to support the continued development and workplace flexibility of those already in employment.

ICM's global services include the design, development and certification of business education and training programmes for education providers; the development and certification of tailored education and training programmes for the corporate sector, emerging industries and the global workforce and the examination, assessment and certification of students undertaking business, management and related vocational education programmes.

An acknowledged specialist in the design and development of progressive, practical and multi-functional programmes of study, the Institute works with a range of public and private sector clients including universities, business schools, colleges, training providers, International Development Agencies, government agencies and local authorities.

ICM provides examinations in more than 200 subject areas ranging from accounting and finance to tourism and hospitality and from marketing and advertising to project management and examines and certifies candidates to an internationally consistent standard.

3 ICM Articulation Agreements with Universities

The Institute has formal partnership arrangements with universities in the UK and overseas. A full list of progression routes from ICM qualifications into Undergraduate and Post Graduate courses at UK Universities is available from the ICM website.

Established articulation arrangements provide direct access to the second and final years of a wide range of BA/BSc degrees for ICM Diploma qualifications (Level 5 Diploma) and

Advanced Diploma qualifications (Level 6 Diploma). Access to Masters programmes also exist for those with ICM Graduate Diplomas (Level 6) and ICM Post Graduate Diplomas (Level 7). In addition, ICM Certificate (Level 4 Diploma) holders may be eligible for entry to year 1 of appropriate degrees.

Subject to status and grades obtained, students holding ICM Diploma qualifications at levels 4, 5, 6 and 7 are accepted onto Undergraduate and Post Graduate degree programmes offered by institutions in continents across the globe.

Our strategic partners have agreed that students can enter their degree programmes with Advanced Standing, provided they possess the right Grade profile and are able to meet other admissions criteria, such as language competence. The stated grade and points requirements may be subject to local variations.

Entry to the First Year

Application for entry to the first year of a relevant degree programme will be considered for those students who hold a relevant ICM Certificate Level Award.

Entry to the Second Year

Application for entry to the second year of an Honours degree programme will be considered for students who have passed a relevant ICM Diploma (Level 5) programme and have met the following requirements:

- obtained at least 24 Points from 8 subjects leading to the qualification
- obtained at least a Grade C in all subjects in the Diploma

Entry to the Final Year

Students who have passed a relevant ICM Advanced Diploma (Level 6 Diploma) programme will be considered for final year entry if they have achieved the following:

- obtained at least 32 Points from 12 subjects leading to the Advanced Diploma
- obtained at least a Grade C in all subjects in the Advanced Diploma

Entry to the Post Graduate Year

Students who have passed a relevant ICM Graduate Diploma (Level 6 Diploma) programme will be considered for entry to Masters programmes if they have achieved the following:

- obtained at least 12 Points from the final 4 subjects leading to the qualification
- obtained at least a Grade C in all subjects in the Graduate Diploma

Converting ICM subject grades into points

The following rules apply in relation to converting ICM subject grades into points:

- an 'A' grade is awarded 6 points
- a 'B' grade is awarded 4 points
- a 'C' grade is awarded 2 points
- a 'D' grade is awarded 0 points

Progression Routes

Students wishing to progress to degree programmes should review the range of courses available at our partner Universities. Information on appropriate university courses can be obtained from our website.

The Institute's qualifications are also recognised by leading professional examining bodies for either subject exemption or registration purposes. Further details can be obtained from the appropriate examination bodies.

4 Learning, Teaching and Assessment Strategy

Tuition in preparation for the Institute's examinations takes place on a number of levels, including lectures, seminars, class discussion and problem review and analysis.

Formal lectures provide a foundation of information, which students build on through directed learning and self-managed study outside the classroom.

Students are actively encouraged to form study groups to discuss course material, fostering a greater depth of learning experience.

4.1 Assessment

Assessment for the majority of programmes is based on final examinations. The Institute has a traditional approach to assessment. Formative assessment is provided by ICM Teaching Centres as and when appropriate and may include; essays, in-class tests, role play exercises, presentations and projects. However, in terms of gaining a professional qualification, and in order to maintain standards, ICM believes that students should be formally assessed on the body of knowledge covered during the course and be examined as individuals on the required learning outcomes.

4.2 Student Workload

In accordance with nationally accepted codes of practice in the UK, each 20 credit unit represents a total of approximately 200 hours of learning. Typically, each ICM award at undergraduate level comprises four units of 20 credits each. Students must complete four units at each level leading to the awards of Certificate (Level 4 Diploma), Diploma (Level 5 Diploma), Advanced Diploma (Level 6 Diploma) and Graduate Diploma (Level 6 Diploma). Thus, for example, in order to gain an ICM Advanced Diploma, a student must have completed the Certificate, Diploma and Advanced Diploma stages. The Post Graduate Diploma (Level 7 Diploma) consists of 120 credits divided into six units.

The learning hours for each unit are subdivided into appropriate categories of learning opportunities, such as lectures, seminars, preparation time, directed study, time spent on assessment items and exam preparation. At least one quarter of this time is usually devoted to formal contact time.

A further one quarter of this time is related to directed learning. The balance of workload is comprised of individual, self-managed student learning and revision.

Note that for a unit delivered in standard mode, the ICM examinations calendar accommodates a teaching year of approximately 2 x 20 teaching weeks, and four weeks of revision/end of year assessment.

Furthermore, each unit is assigned to a particular 'Level', with each Level corresponding to the group of subjects contained within the programmes leading to the award of a Certificate (Level 4 Diploma), Diploma (Level 5 Diploma), Advanced Diploma (Level 6 Diploma), Graduate Diploma (Level 6 Diploma) or Post Graduate Diploma (Level 7 Diploma).

5 ICM Qualifications and Progression

Understanding your qualification is important and the following guidelines outline how ICM qualifications fit within the UK National Qualifications Framework and support vocational learning.

ICM has benchmarked its qualifications against the UK National Qualifications Framework (NQF). In recognition of the NQF levels and with reference to appropriate National Occupational Standards, the Institute has produced the following level descriptors which should be read in conjunction with the table provided in section 5.6.

5.1 ICM Certificates (equivalent to NQF Level 4 Diplomas)

ICM Certificates are awarded to those who have passed Part 1 (the first four or five subjects, depending on the course) of an ICM Diploma programme. See below for ICM Diploma Entry Requirements. ICM Certificates represent a level of qualification that recognises the ability to gain, and where relevant apply a range of knowledge, skills and understanding.

ICM Certificate holders should be able to display competence in the application of knowledge in the performance of a range of work activities, some of which may be routine and predictable with some being complex or non-routine.

Learning at this level involves gaining knowledge and skills appropriate for individuals working semi-independently, or receiving basic supervision and training from others in their field of work.

Students should begin to develop a degree of individual responsibility or autonomy in their study as well as the ability to collaborate with others, for example through participation in work groups or teams.

Successful completion of the ICM Certificate enables entry to the first year of appropriate degree programmes at a range of Universities. For a complete list of progression routes please refer to the website.

5.2 ICM Diplomas (equivalent to NQF Level 5 Diplomas)

Entry to an ICM Diploma programme requires completion of secondary education or an equivalent and recognised programme of study.

ICM Diplomas represent a level of qualification which recognises the ability to gain, and where relevant apply a range of knowledge, skills and understanding.

ICM Diploma holders should be able to display competence in the application of knowledge in a broad range of varied work activities performed in a wide variety of contexts, most of which are complex and non-routine.

Learning at this level involves obtaining detailed knowledge and skills appropriate for people working independently, or providing basic supervision and training of others in their field of work and people wishing to go to University.

Progression is available from the ICM Diploma to the second year of relevant degree programmes at a range of Universities. For a complete list of progression routes please refer to the website.

5.3 ICM Advanced Diplomas (equivalent to NQF Level 6 Diplomas)

Entry to an ICM Advanced Diploma programme requires completion of the ICM Certificate and Diploma in the selected programme. Students holding other relevant and equivalent qualifications which contain ICM Diploma subjects could qualify for entry as well as subject and Level exemptions.

ICM Advanced Diplomas represent a level of qualification which involves specialist learning and detailed analysis of a high level of information, knowledge and skills in a specified area of work or study.

Students undertaking an ICM Advanced Diploma should demonstrate the depth of knowledge and understanding of an area of work or study to enable them to formulate solutions and responses to complex problems and situations.

ICM Advanced Diplomas are appropriate for people working in positions such as Senior Supervisors, Professionals or Managers. These individuals need to demonstrate significant levels of knowledge, a high level of work expertise in job roles and competence in managing and training others. Learning at this level is appropriate for people working in technical and professional jobs, and/or managing and developing others.

The ICM Advanced Diploma is equivalent to NQF Level 6 and in terms of level and credit value these qualifications are comparable to UK Intermediate Higher Education qualifications such as HNDs, Diplomas of Higher Education and Foundation Degrees.

Progression is available from ICM Advanced Diplomas to the final year of relevant degree programmes at a range of Universities. For a complete list of progression routes please refer to the website.

5.4 ICM Graduate Diplomas (equivalent to NQF Level 6 Diplomas)

Entry to an ICM Graduate Diploma programme requires prior completion of the ICM Diploma and Advanced Diploma in the selected programme.

Advanced Standing and Exemptions: Students holding relevant degrees and equivalent qualifications which contain ICM Certificate, Diploma and Advanced Diploma subjects could qualify for entry as well as subject and Level exemptions.

Students at this level study highly developed and complex levels of knowledge enabling the development of in-depth and original responses to complicated and unpredictable problems and situations.

Learning at the Graduate Diploma level involves the demonstration of high level specialist professional knowledge appropriate for senior professionals and managers. Indicative competencies involve the application of a range of fundamental principles across a wide and often unpredictable variety of contexts as well as the ability to perform technical or professional work activities in a variety of contexts with a substantial degree of personal responsibility and autonomy.

A qualification at this level is appropriate for people working as knowledge-based professionals or in professional management positions. This qualification is equivalent to a Bachelors degree, and progression is available from the ICM Graduate Diploma to Post Graduate programmes such as Masters degrees.

5.5 ICM Post Graduate Diplomas (equivalent to NQF Level 7 Diplomas)

Entry to an ICM Post Graduate Diploma programme requires completion of an ICM Graduate Diploma, another Level 6 award, or a degree level qualification in an appropriate discipline.

Refer to Section 6 for Advanced Standing arrangements for mature candidates.

Students at this level of study should display a mastery of high level knowledge and skills and have professional and research-based skills.

This qualification is equivalent to two thirds of a Masters degree (MBA or MA) and advanced standing can be given onto a range of Masters degrees. For a complete list of progression routes please refer to the website.

5.6 Relative Positioning of ICM Qualifications

The following table gives an indication of the relative positioning of ICM awards, compared with other types of qualifications and levels. Reference is made to levels in the UK National Qualifications Framework and example qualifications at each level. In addition, the final column in the table (FHEQ) shows the 'equivalent' qualifications commonly being developed and delivered in the University sector. For example, these indicate that the ICM Advanced Diploma equates to an intermediate level award (in terms of credit accumulation this ICM qualification equates to a Higher National Diploma). Furthermore, the ICM Graduate Diploma equates to a Bachelors degree level qualification and the ICM Post Graduate Diploma equates to a Masters degree level qualification.

Relative Positioning of ICM Qualifications

National Qualifications Framework (Levels and example vocational qualifications)	Framework for ICM Levels	Framework for Higher Education Qualification Levels (FHEQ)
Level 7 Professional Diploma in Translation	ICM Post Graduate Diploma (Level 7 Diploma)	M (masters) , Masters degrees, Post Graduate certificates and diplomas
Level 6 Diploma in Management	ICM Graduate Diploma (Level 6 Diploma)	H (honours) Bachelors degrees (BSc/BA)
	ICM Advanced Diploma (Level 6 Diploma)	I (intermediate) Diplomas of higher education, foundation degrees, Higher National Diplomas
Level 5 BTEC Higher National Diploma in 3D Design	ICM Diploma (Level 5 Diploma)	C (certificate) Certificates of higher education
Level 4 Certificate in Early Years Practice	ICM Diploma (Level 5 Diploma)	
Level 3 Certificate in Small Animal Care NVQ in Aeronautical Engineering A levels		
Level 2 Diploma for Beauty Specialists NVQ in Agricultural Crop Production GCSEs Grades A*-C		
Level 1 Certificate in Motor Vehicle Studies NVQ in Bakery GCSEs Grades D-G		
Entry – e.g. Entry Level Certificate in Adult Literacy		

6 Student Registration & Course/Level Entry Requirements

6.1 Student Registration

In order to undertake any ICM examination candidates must be Registered ICM Student Members.

Student Membership can be obtained by completing the appropriate Student Registration Application form and returning the form and the Student Registration Fee to the Institute. Details of Student Registration Fees can be found on the ICM website.

The Student Registration fee is valid for one year and can be renewed annually.

Important Note: All students wishing to register for any ICM Advanced Diploma programme or above, MUST complete and attach an Academic History form to their Student Registration form. Copies of all qualifications and Awards obtained by the student must also accompany the Academic History form.

The Academic History form is used to ensure that students are qualified to commence their studies at the Level they have selected.

6.2 Student Registration Fees

Student Registration fees for standard ICM Awards and programmes are based on the country in which you will undertake your examinations. The current fees levels are as follows:

Group 1: If you are based in Europe, and EU Member State, North America, a Gulf State, India, the Middle East, Australasia, Singapore, South Africa, China, Hong Kong or Malaysia your Registration Fee will be £50.00 Pounds Sterling.

Group 2: If you are based in sub-Saharan Africa, Central or South America, Pakistan, Bangladesh, the Caribbean or North Africa your Registration Fee will be £25.00 Pounds Sterling.

Group 3: A special rate exists for students in countries which have (a) emerged from conflict (b) countries in which the general population is subject to great poverty and (c) countries in which the UN acknowledge that the level of economic activity and national per capita income is unacceptably low.

6.3 Course/Level Entry Requirements

ICM professional programmes are structured in 'Levels'. These Levels are designed to provide a structured and progressive level of knowledge.

All students are required to commence their studies at the Diploma Level of all programmes unless they are able to claim subject-for-subject or Level exemptions.

Subject-for-subject exemptions can be applied for if the student has (a) been examined, in the subject, by another recognised Awarding body and (b) has passed the examination/s set by the alternate body.

The Institute operates an 'Open Entry' policy in respect of most of its Diploma Level vocational programmes, subject to appropriate work experience, but prospective students should note that the following qualifications are recommended for those wishing to undertake ICM Diploma Level programmes:

Entry to an ICM Diploma Level Programme (NQF Level 5)

Entry to an ICM Diploma programme requires completion of secondary education or equivalent. For example:

- One GCE A-level plus three GCSEs (or equivalents) or 5 GCSEs
- A suitable BTEC National Award
- Any qualification equivalent to one or more of the above

The minimum age for registration for the majority of programmes is 18. Applicants over the age of 20 who do not hold one of the recommended entry qualifications may also register for some Diploma Level programmes providing they have been in full-time employment for a minimum of two years and can produce a letter from their employer to confirm this.

Entry to an ICM Advanced Diploma Programme (NQF Level 6)

Entry to an ICM Advanced Diploma programme requires completion of the ICM Diploma Level of the selected programme.

Entry to an ICM Graduate Diploma Programme (NQF Level 6)

Entry to an ICM Graduate Diploma requires completion of the ICM Diploma and Advanced Diploma in the selected programme.

Entry to an ICM Post Graduate Diploma Programme (NQF Level 7)

Registration for an ICM Post Graduate Diploma is accepted from those:

- who have completed an ICM Graduate Diploma
- who hold any Level 6 business or management Award
- holders of business and management degree level qualifications

Mature Candidates. Applications from those over the age of 25 who do not meet the standard Entry Requirements will also be considered providing they:

- Are over the age of 25
- Have been in employment for 5 years – a letter of support is required from the applicant's employer; and
- Hold a management or senior supervisory position

7 Examinations and Results

7.1 Examinations

In order to achieve a consistent global standard the Institute sets all examination papers and all candidate scripts are returned to the Institute for marking.

Invigilation of examinations is undertaken either by external Invigilators who are appointed by the Institute or by the British Council. Examinations are held in March, June, September and December and the Examination Timetable can be found on the ICM website.

Candidates must be registered and paid-up Student Members of the Institute at the time they undertake their examinations. Examination papers are securely distributed to ICM Approved Centres and scripts are assessed and moderated in the UK by ICM Appointed Examiners.

Full details of Examination dates can be found on the ICM website.

7.2 Examination Entry Fees and Forms

Examination Entry fees are shown on the appropriate Examination Entry form for the subject/programme you are undertaking. In general, the standard Examination fee is £26.00 Pounds Sterling per subject. There are however some specialist programmes where a higher subject fee may be payable. If you have any queries relating to fees please contact your Teaching Centre.

In order to undertake any ICM Professional or Single Subject examination you must be a Registered and paid-up ICM Student Member.

To enter for an examination you need to complete the relevant Examination Entry form and submit it to the Institute.

7.3 Examination Timetable

ICM examinations take place four times each year, in March, June, September and December. The Timetable for each year states the Closing Date for receipt of entries for each examination Series. Please visit the website to view the ICM examination timetable.

7.4 Examination grades and re-marking

You can request that your examination script is re-marked if you are unhappy with your result.

The fee for this is £35.00 Pounds Sterling per script. The Institute operates a triple marking and moderation system. In the event that the moderator increases the original marks awarded, the fee for re-marking your script will be refunded to you. Should the Grade awarded remain the same, you will be issued with a full Examiner's Report detailing your examination performance. The Institute retains answer scripts for a maximum period of six months. Examination scripts/answer books are not returned to candidates under any circumstances.

7.5 Examination re-sits

Although ICM Examinations are held every twelve weeks it should be noted that it takes an average of twelve weeks to mark the scripts after each Examination Series.

If you sit, for example, for one or more subjects in March you will not receive your results until June. This means that if you were to fail a subject in March, you would not be able to re-sit the subject in June, as you will have missed the Closing Date for the June Series.

Our advice is that you try to split your subject examinations between two consecutive Examination Series e.g. If your programme has four subjects you could take two subjects in one series and two in another series.

On this basis, were you to fail one subject in March you would be able to re-sit it in September, giving you plenty of time for revision.

7.6 Examination Closing Dates

There is a Closing Date for receipt of Examination Entries and candidates entering for examinations must ensure that their completed Examination Entry forms and fees reach the Institute before the Closing Date for each Examination Series. Examination Timetables indicate the closing date for receipt of entries for each sitting and this information also appears on the ICM website. Entries received after the Closing Date are automatically carried forward to the next Examination Series.

7.7 Examination Results

Results are distributed within twelve weeks from receipt of scripts. Candidates are advised not to telephone the Institute for results as this information is confidential and cannot be disclosed over the telephone.

7.8 Examination Grades

Should you wish to re-sit any examination to improve your previous Grade, please note that the latest Grade you obtain will stand.

7.9 Transcript of Academic Results

You may request a transcript of your Academic Results, however please note there is a charge of £15 Pounds Sterling for each Award transcript requested.

7.10 Replacement Certificates

Replacement certificates are available on payment of a fee of £20.00 Pounds Sterling per certificate. Please include your Student Registration Number together with your current postal address and indicate which certificate is required.

7.11 Deferrals

There is a fee of £15.00 Pounds Sterling per subject should you wish to defer your examinations to another Series for health or for any other reason. If you are unable to undertake your examinations, it is essential you advise ICM before the appropriate examination date, otherwise the full entry fee of £26.00 Pounds Sterling will be applicable. Please note that you may only defer examinations on one occasion. The full entry fee of £26.00 Pounds Sterling per subject will become due if you defer on more than one occasion.

7.12 Subject Exemptions for Professional Programmes

Students holding relevant recognised qualifications from other professional bodies or recognised Higher Education institutions may apply for Subject Exemptions, on a subject-for-subject basis. It may also be possible, subject to qualifications held, to obtain exemption from a Level within a programme. Documentary evidence is required before any decision can be made in connection with the granting of Subject/Level Exemptions. No exemptions are given for case studies or assignments. Internally awarded school certificates and diplomas **are not accepted for exemption purposes.**

7.13 Single Subject Candidates

Registered ICM students who do not want to complete a full ICM programme may study individual subjects. Single Subject candidates receive a Single Subject Diploma on successful completion of the relevant subject examination. Single Subjects qualify, on a subject-for-subject basis, for subject exemptions from ICM professional programmes.

- Note:**
1. Case Studies, Assignments and Projects, including ALL subjects in any Post Graduate programme, do not qualify for Single Subject Awards.
 2. A student who undertakes, on a Single Subject basis, subjects within a Diploma, Advanced Diploma, Graduate Diploma or Post Graduate ICM programme will not be entitled to a professional Award unless they are exempted from or have completed all lower Levels of that Award.
 3. In order to comply with UKBA requirements, overseas students studying in the UK (excluding those from EU countries) are not permitted to undertake Single Subjects and must undertake a professional programme.

8 Subject advice, educational guidance and student support

You are expected to be independent and to take responsibility for your own academic and personal life. However, your study centre should also provide appropriate help and assistance. Your tutors will direct your studies and ensure that you know what work you need to cover in any given unit. Seek advice from academic staff either during or after class or try to see them during their office hours.

8.1 Study Methods

Teaching Centres are provided with a detailed syllabus and reading list for each subject area. Each Unit Syllabus clearly defines the areas that you will be required to cover for each subject and your examination questions will be based on the areas and topics detailed for

each unit. It is important to ensure that you obtain a copy of each unit syllabus from your Teaching Centre. Alternatively, this information can be obtained online at www.icm.education, in the 'Single Subject' section.

Each Unit Syllabus is normally linked to one main textbook and the examiners base their questions on the contents of the nominated core text.

The Unit Syllabuses also give details of 'Alternative Texts' and texts recommended for further reading. It is advised that you should refer to the 'Alternative Texts' in order to develop your skills and broaden your knowledge of the subject area.

8.2 Payment Methods

For our accepted methods of payment, please refer to the ICM website: www.icm.education

8.3 Choosing your course of study

As an ICM Student Member you can work towards obtaining either a recognised Professional qualification or study for one or more of the 200 Single Subject Awards from the list of subjects offered by the Institute. The choice is yours.

8.4 ICM Approved Centres

Tuition leading to the Institute's examinations can only be provided by Institutions which have been granted ICM 'Approved Centre' status. Please note that some ICM Teaching Centres specialise in particular subject areas and not all ICM Centres will necessarily offer tuition for every ICM course programme. Visit the website to find an ICM Approved Centre near you.

9 Textbooks

The recommended textbooks for each subject are shown on each subject syllabus. Examiners base their questions on the contents of the recommended texts and it is therefore important for you to ensure that you have access to the appropriate texts. You can obtain the full list of books available to purchase from ICM and/or place orders by either contacting your Centre or complete the Book Order Form and send it to ICM's Book Sales Manager at: info@icm.education .

10 Students with specific learning difficulties

If you are diagnosed with a specific learning difficulty you may be granted special arrangements for your examination/s. We will require a copy of an Assessment Report issued within the last three years. The amount of additional time and any other arrangements will be determined on the basis of the Report relating to your circumstances. It is possible that you may be granted permission to use a computer or laptop without internet connection in your examinations.

11 Copies of past examination papers and other forms of assessment

The ICM website, www.icm.education, provides a database of recent examination papers, assignments and Case Studies. These can be found in the Student Resources section of the website.

12 Unit Information

Covering all the major business management areas and topics, the ICM programmes have, over the past thirty years, achieved international recognition and are currently undertaken by students in many countries around the world.

In addition to providing a comprehensive knowledge of each of the major business functions, the structure of the courses ensure that students have the widest possible range of career, employment and higher education options open to them on successful completion of their studies.

12.1 Programme Objectives

To provide prospective professional computing & information processing students with a body of knowledge which will:

- increase their employment opportunities
- prepare them for supervisory and management careers in related industry and commerce and
- provide them with a qualification which will enable them to progress to higher level general management or specialised programmes at a later stage in their work or academic careers

The ICM Professional Computing & Information Processing programme is also suitable for working supervisors and managers who require recognised management qualifications for career advancement or promotion purposes.

12.2 Recommended Course Duration

To help calculate the duration of the programme, please refer to the section entitled 'Student Work Load' in section 4.2 of this handbook.

It is expected that a student will need at least 18 months to 2 years of full-time study at an ICM Approved Centre to complete the full Advanced Diploma programme and a further 6-9 months to complete the Graduate Diploma.

12.3 Examination Grades

Grade A – 70% and above

Grade B – 60% to 69%

Grade C – 50% to 59%

Grade D – 40% to 49%

Grade F – Fail – 39% and under

12.4 Continuing Education

The ICM programme will serve as an excellent route for students who ultimately seek full professional status and will provide first class underpinning knowledge for the mainstream UK degrees in the relevant areas. Holders of an ICM Diploma may enter the ICM Advanced Diploma programme and completion of this could enable entry to the final year of appropriate Honours degree programmes (see Section 3 for more details).

13 Course Structure

The Diploma in Professional Computing & Information Processing – Part 1

1. General Purpose Software
2. Information Processing
3. Numeracy & Statistics
4. Programming

A Certificate in Professional Computing & Information Processing is awarded on completion of all four units in Part 1

The Diploma in Professional Computing & Information Processing – Part 2

5. Applications
6. Number & Logic
7. Programming Project
8. Systems Analysis

The Diploma in Professional Computing & Information Processing is awarded on completion of all eight units in Part 1 & Part 2

The Advanced Diploma in Professional Computing & Information Processing

9. Feasibility Study
10. Hardware & Operating Systems
11. Managing Computer Systems
12. Networks

The Advanced Diploma in Professional Computing & Information Processing is awarded on completion of all twelve units.

13.1 Unit Syllabuses

Detailed syllabuses for this programme are contained in the following sections.

13.1.1 General Purpose Software Syllabus

Unit Title	General Purpose Software
Unit Code	GPS-0908
Level	4 Diploma
Credits	20
Unit Leader	MJ
Pre-requisites	
Main Aim(s) of the Unit:	
<p>This unit introduces a range of computer packages and applications to the student. The student will be able to select an appropriate package given a specific problem and will be able to utilise off-the-shelf packages to produce solutions. Furthermore, the student is introduced to the role of operating systems in relation to such packages.</p>	
Main Topics of Study:	
<p>Spreadsheet</p> <ul style="list-style-type: none"> ▶ Layout of a spreadsheet screen. Help features. Loading/saving models ▶ Cell formatting. Font/size. Alignment. Column width, row height. Boxing grouped cells. Moving/copying/deleting cell(s) ▶ Data types including NUMBER, TEXT, CURRENCY, SCIENTIFIC, DATE, TIME ▶ Data formatting – decimal places. Alignment. Date/time options ▶ Formulae. Cell addresses. Absolute and relative addressing. Replicating a formula to a block of cells ▶ Functions: <ul style="list-style-type: none"> a. Number: SUM, COUNT, AVERAGE, MAX, MIN, INT, ROUND, RANDOM, SQRT, ODD, SIN, COS, TAN, POWER b. Text: CHAR, VALUE, TRIM, RIGHT, LEFT, UPPER, LOWER c. Decision: IF, AND, OR, NOT ▶ Nesting functions within functions ▶ Lookup tables and their use ▶ Design and construct spreadsheet models for a given problem. Layout design ▶ Print data. Print formulae adjusting column widths as necessary. Print with/without grid lines. Print with/without row/column labels. Fitting to a page ▶ Charts: pie chart, histogram, bar chart, line graph. customising output ▶ 'What-if' models for the determinations of best results. Practical use in business ▶ Exporting/Importing data to/from other packages <p>Word Processing</p> <ul style="list-style-type: none"> ▶ Layout of a word processing screen. Help. Loading/saving documents. Multiple documents ▶ Document formatting. Margins. Alignment. Indentation. Bullet points. Page breaks ▶ Font/font size. Varying fonts/size to add effect to a document. Bold/italics/underline ▶ The concept of hidden embedded control characters to format, e.g. underlining 	

- ▶ Block editing. Copy/cut blocks of text. Tabs. Changing case
- ▶ Search and replace in lengthy documents. Use of previous documents to create an updated version such as a newsletter, catalogue
- ▶ Spell check and the options IT offers. Grammar checking. Limitations of both. Autocorrect
- ▶ Creating a table
- ▶ Mail merge. Realistic business examples of its use
- ▶ Quick entry of commonly used/local words/phrases using a few keys. Macros
- ▶ Final checks on a document. Print preview
- ▶ Printing: sections or entire document. Choosing quality of print. Multiple copies
- ▶ Columns - newspaper style. Choosing column options
- ▶ Inclusion of clip art. Artistic lettering. Exporting. Importing data to/from other packages

Database

- ▶ Concept of a database as a single system with multiple users and uses
- ▶ Relational databases and their advantages – single entry, consistency, integrity, redundancy, independence of data and programs
- ▶ Concept of normalisation of data
- ▶ Creation of a database. Defining the data structure. Tables/columns
- ▶ Key fields. Primary key. Secondary key. Foreign key
- ▶ Data modelling. E-R diagrams
- ▶ Entering data. Editing data. Searches/enquiries. SQL. Basic SQL statements – SELECT...FROM...WHERE, CREATE TABLE..., INSERT INTO...
- ▶ Report generation. Customisation of reports. Ordering. Column totalling
- ▶ Printing reports

Graphics and Presentation Packages

- ▶ Means of producing graphics – limited drawing in word processing, charts in spreadsheets to drawing packages and commercial CAD packages
- ▶ Typical uses of packages by industrial/commercial users
- ▶ Layout of a graphics package screen. Help features
- ▶ Main features. Line drawing. Line selection. Boxes. Shapes. Text. Libraries of objects
- ▶ Manipulating the drawing features. Moving, extending, copying, rotating, hatching
- ▶ 3-D effects. A drawing as a series of levels
- ▶ Dimensioning
- ▶ Printing. Saving/loading
- ▶ Presentation package (e.g. PowerPoint) as a combination of text/graphics
- ▶ Features of a presentation package. Creating slides and a slide show. Customising to house style

Operating Systems

- ▶ Purposes of an operating system. GUI operating systems. Comparison between GUI and command control
- ▶ General features of operating systems – folders, files. Types of files for program, data, text, email, pictures etc
- ▶ File manipulation – copying, moving, deleting, printing, Batch files

- ▶ Customising the desktop
- ▶ Installing and customising software packages

Learning Outcomes for the Unit:

At the end of this Unit, students will be able to:

- | | |
|----|--|
| 1. | Use a range of applications packages including spreadsheets, databases, and graphics software. |
| 2. | Describe an operating system and its function. |
| 3. | Apply packages to a range of real-life business problems. |

The numbers in the boxes below show which of the above module learning outcomes are related to particular cognitive and key skills:

Knowledge & Understanding	Analysis	Synthesis /Creativity	Evaluation	Interactive & Group Skills
1, 2	1	1, 3	1, 3	1, 3
Self-appraisal/ Reflection on Practice	Planning and Management of Learning	Problem Solving	Communication & Presentation	Other skills (please specify):
3	1-3	1, 3	2	-

Learning and teaching methods/strategies used to enable the achievement of learning outcomes:

Learning takes place on a number of levels through lectures, class discussion including problem review and analysis. Formal lectures provide a foundation of information on which the student builds through directed learning and self managed learning outside of the class. The students are actively encouraged to form study groups to discuss course material which fosters a greater depth learning experience.

Assessment methods which enable the student to demonstrate the learning outcomes for the Unit: Weighting:

Examination: 3 hours duration	100%
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Indicative Reading for this Unit:

Main Text

No set textbook

Course materials are available on the ICM website www.icm.education

Alternative Texts and Further Reading

In addition, computer manuals for specific computer packages can be used

Guideline for Teaching and Learning Time (10 hrs per credit):	
50 hours	<p>Lectures / Seminars / Tutorials / Workshops</p> <p>Tutorial support includes feedback on assignments and may vary by college according to local needs and wishes.</p>
50 hours	<p>Directed learning</p> <p>Advance reading and preparation / Class preparation / Background reading / Group study / Portfolio / Diary etc.</p>
100 hours	<p>Self managed learning</p> <p>Working through the course text and completing assignments as required will take up the bulk of the learning time. In addition students are expected to engage with the tutor and other students and to undertake further reading using the web and/or libraries.</p>

13.1.2 Information Processing Syllabus

Unit Title	Information Processing
Unit Code	IP-0908
Level	4 Diploma
Credits	20
Unit Leader	MJ
Pre-requisites	
Main Aim(s) of the Unit:	
This unit describes the main elements in the processing of data. These include input, output and data checking. The role of the main processor (CPU) is described and different types of software are explored. Various approaches to file organisation are considered and the importance of security in the user-interface is stressed.	
Main Topics of Study:	
Introduction	
<ul style="list-style-type: none">▶ Definitions of hardware, software, package, program, data, parameter▶ Overview of the range of computers currently used from lap-top to supercomputer▶ Configuration diagram showing how the components of a computer system are related. Difference between control signal and data flow	
Input	
<ul style="list-style-type: none">▶ Review of methods of data capture to include OCR, OMR, MICR, barcodes, text/image scanners, magnetic stripe, voice, touch screen, keyboard, and concept keyboard▶ Advantages and disadvantages of these methods of data capture when compared with others. In particular, a comparison of speeds, costs, user involvement, accuracy of the data received by the computer▶ Choose the best data capture method for a given application▶ Conditions required for each of these data capture devices to be used. A detailed explanation of the internal operation is NOT required	
Data Checking	
<ul style="list-style-type: none">▶ Difference between validation and verification▶ Validation checks – range, data type, presence, sequence▶ Specifying the validation possible for a given set of data▶ Check digit systems – normally using modulo-11 and weights 6,5,4,3,2,1 etc<ul style="list-style-type: none">i) specify which data can/should contain check digitsii) State the guarantees that check digit numbers provideiii) Calculate the check digit for a given numberiv) Validate a number which contains a check digitv) The use of 'X' as a check digit	

Output

- ▶ Ways in which data can be represented – tables, lists, summary statistics, charts, textual reports
- ▶ Name the range of printers currently available – laser, ink jet
- ▶ Advantages and disadvantages of different types of printers
- ▶ Screen output. Its limitations
- ▶ Identifying whether screen or printer would be more suitable for a given application
- ▶ Types of plotters currently available. Comparison with printers
- ▶ Identifying whether a printer or plotter would be more suitable for a given application
- ▶ Other forms of output. COM. Microfiche. Applications where these might be used

Processor

- ▶ Component parts of the CPU and their functions – ALU, control unit
- ▶ MAIN memory and its various forms – RAM, ROM, cache, special purpose RAM, e.g. for VDU
- ▶ Name registers in general use – accumulator(s), program counter (PC), Memory address (MAR), Memory data/buffer (MDR/MBR), Current instruction (CIR)
- ▶ Fetch-execute cycle
 - i) Name the steps an instruction passes through in the cycle
 - ii) Identify how the registers are used for basic instructions, e.g. LDA Price, SUB Tax. This topic MUST be covered in detail
- ▶ Bus structures

Software

- ▶ Distinction between system software and application software
- ▶ Distinction between general purpose and special purpose software. Understand that the USER dictates how general purpose software is used
- ▶ Outline of features of operating systems including systems with multiprogramming facilities. Name different operating systems currently in use and compare in outline
- ▶ System software
 - i) File management software
 - ii) Utility software. Sort file. Merge files
 - iii) Language translators. Assembler, compiler, interpreter – basic differences

Filing Systems

- ▶ Review of current storage devices – diskette, hard disc, Winchester, flash drive/pen stick, optical devices, digital versatile disk, tape and cassette
- ▶ The need for buffers and their role in data transfer
- ▶ Definitions of storage terms – file, record, field, cylinder, track, sector, header label, inter-block gap. Distinction between storage device and storage medium
- ▶ The structure of data stored on a storage medium
- ▶ Data transfer checks. Parity and its purpose. Describe odd/even parity with specific numeric examples illustrating acceptance/failure. Cyclic redundancy check
- ▶ File Organisation and File Access
 - i) Define organisation types – serial, sequential, indexed sequential, random

- ii) Distinction between organisation and access. Examples of a file being accessed in more than one way
- iii) For indexed sequential organisations – an understanding of up to 2 -levels of indexing
- iv) Appreciation that not all record keys appear in the index. How ANY record can be accessed
- v) Overflow areas
- vi) For random access – hashing algorithms. Develop a simple algorithm for a given situation
- vii) For each of the four organisation methods, describe the PROGRAM sequence of steps to:
 - a) access a SINGLE record from the file
 - b) add a new record to the file
 - c) delete a record from the file
- ▶ Sequential master file update using an UNSORTED transaction file. Labelled system flow chart for this process
- ▶ Selecting the most appropriate file organisation for a given application

Processing

- ▶ Different types of processing – batch and real-time
- ▶ The role of batch processing with today’s sophisticated systems. Examples of batch processing currently in use
- ▶ Real-time systems – examples of current use

Security and Privacy

- ▶ Security defined as the safeguard of hardware, software and data
- ▶ Distinction between security and privacy
- ▶ REALISTIC methods of data security – securing against
 - i) accidental damage or loss of data
 - ii) deliberate sabotage
- ▶ Methods of achieving good privacy of data
- ▶ Determining the security/privacy required for a given situation

Learning Outcomes for the Unit:

At the end of this Unit, students will be able to:

1.	Describe the main configuration of a computer system including input, output and processor.
2.	Identify different types of software including system and application software.
3.	Distinguish between different filing and processing systems.
4.	Understand the user’s role in data security.

The numbers in the boxes below show which of the above module learning outcomes are related to particular cognitive and key skills:				
Knowledge & Understanding	Analysis	Synthesis /Creativity	Evaluation	Interactive & Group Skills
1, 2, 4	3	3, 4	3	4
Self-appraisal/ Reflection on Practice	Planning and Management of Learning	Problem Solving	Communication & Presentation	Other skills (please specify):
-	1-4	3	1, 2, 3	-
Learning and teaching methods/strategies used to enable the achievement of learning outcomes:				
Learning takes place on a number of levels through lectures, class discussion including problem review and analysis. Formal lectures provide a foundation of information on which the student builds through directed learning and self managed learning outside of the class. The students are actively encouraged to form study groups to discuss course material which fosters a greater depth learning experience.				
Assessment methods which enable the student to demonstrate the learning outcomes for the Unit:				Weighting:
Examination: 3 hours duration				100%
Indicative Reading for this Unit:				
Main Text				
No set textbook				
Course Materials are available on the ICM website www.icm.education				
Alternative Texts and Further Reading				
Computer Science for Advanced Level, 4th edition, R. Bradley, Stanley Thornes				
A Level Computing, 5th edition, P.M. Heathcote & S. Langfield, Payne Galloway				
Guideline for Teaching and Learning Time (10 hrs per credit):				
50 hours	Lectures / Seminars / Tutorials / Workshops			
	Tutorial support includes feedback on assignments and may vary by college according to local needs and wishes.			
50 hours	Directed learning			
	Advance reading and preparation / Class preparation / Background reading / Group study / Portfolio / Diary etc.			
100 hours	Self managed learning			
	Working through the course text and completing assignments as required will take up the bulk of the learning time. In addition students are expected to engage with the tutor and other students and to undertake further reading using the web and/or libraries.			

13.1.3 Numeracy & Statistics Syllabus

Unit Title	Numeracy & Statistics
Unit Code	NS-1016
Level	4 Diploma
Credits	20
Unit Leader	GW
Pre-requisites	
Main Aim(s) of the Unit:	
The aims of this unit are to equip students with the necessary skills to interpret information, carry out calculation and interpret the results of that information and later, to equip students with some of the analytical skills that are relevant to the study of Accounting & Finance as a whole.	
Main Topics of Study:	
Revision of Basic Mathematical Techniques	
<ul style="list-style-type: none">▶ Integers, fractions and decimals▶ Order of operations – brackets▶ Percentages and ratios – percentages, profits, proportions and ratios▶ Roots and powers – powers, roots, rules for powers	
Equations and Graphs	
<ul style="list-style-type: none">▶ Formulae and equations – manipulating equalities, linear equations▶ Graphs – Linear equations and graphs, simultaneous equations, non-linear equations	
Data Presentation and Measurements of Location and Dispersion	
<ul style="list-style-type: none">▶ Data – data and information, quantitative and qualitative data, primary and secondary data, discrete and continuous data▶ Data presentation – pictograms, tables, charts (bar charts, pie charts), frequency distributions, histograms, frequency polygons, ogives, scatter diagrams▶ Averages – the arithmetic mean, the mode, the median▶ Dispersion – the range quartiles and the semi-interquartile range	
Probability	
<ul style="list-style-type: none">▶ The concept and rules of probability▶ Expected values▶ Expectation and decision-making	
Frequency Distributions, the Normal Curve and Sampling	
<ul style="list-style-type: none">▶ Probability distributions▶ The normal distribution▶ The standard normal distribution	
Financial Mathematics	
<ul style="list-style-type: none">▶ Interest – simple interest, compound interest, inflation, changes in the rate of interest▶ Savings and loans – regular savings, sinking funds, loans, mortgages	

Learning Outcomes for the Unit:					
At the end of this Unit, students will be able to:					
1.	Identify appropriate types of quantitative information and their sources.				
2.	Rationalise and structure that information.				
3.	Use and analyse information that is presented in numerical form in an appropriate method to extract all relevant trends, patterns and points of importance.				
4.	Present the results and data informative in attractive manners including in diagrammatic form to clients, partners and business colleagues.				
The numbers in the boxes below show which of the above unit learning outcomes are related to particular cognitive and key skills:					
Knowledge & Understanding	Analysis	Synthesis /Creativity	Evaluation	Interactive & Group Skills	Self-appraisal/ Reflection on Practice
1-3	3	3,4	1,2,3	-	-
Planning and Management of Learning	Problem Solving	Communication & Presentation	Practical/Psycho -motor Skills	Other skills (please specify):	
-	1-4	4	4	-	
Learning and teaching methods/strategies used to enable the achievement of learning outcomes:					
Learning takes place on a number of levels through lectures, class discussion including problem review and analysis. Formal lectures provide a foundation of information on which the student builds through directed learning and self managed learning outside of the class. The students are actively encouraged to form study groups to discuss course material which fosters a greater depth learning experience.					
Assessment methods which enable the student to demonstrate the learning outcomes for the Unit:					Weighting:
Examination: 3 hours duration					100%
Indicative Reading for this Unit:					
Main Text					
Business Essentials – Business Maths: Study Text, BPP Learning Media. ISBN: 978-0751768428					
Guideline for Teaching and Learning Time (10 hrs per credit):					
50 hours	Lectures / Seminars / Tutorials / Workshops Tutorial support includes feedback on assignments and may vary by college according to local needs and wishes.				
50 hours	Directed learning Advance reading and preparation / Class preparation / Background reading / Group study / Portfolio / Diary etc.				
100 hours	Self managed learning Working through the course text and completing assignments as required will take up the bulk of the learning time. In addition students are expected to engage with the tutor and other students and to undertake further reading using the web and/or libraries.				

13.1.4 Programming Syllabus

Unit Title	Programming
Unit Code	PR-0908
Level	4 Diploma
Credits	20
Unit Leader	LH
Pre-requisites	
Main Aim(s) of the Unit:	
This unit will introduce the computer programming process and enable students to design and produce programs in a high-level language of their choice. The unit will stress the importance of planning the programming approach and provides a grounding for understanding how professional programmes are developed and implemented.	
Main Topics of Study:	
Overview	
<ul style="list-style-type: none">▶ The difference between different types of languages from assembler, through high level languages to 4GLs and object-oriented languages. An outline history of the development of languages over the years▶ Differences between procedural and declarative languages▶ Summary of the stages of the translation process – compiler and interpreter▶ An appreciation of assembly language code through a limited set of operation codes. How these build into a program. Writing full programs is NOT required	
Program Development	
<ul style="list-style-type: none">▶ Overview of the stages of program development from receiving a program specification to handing over a fully tested and documented program applied to a professional programmer. Candidates should have an appreciation of the difference of scale of real programs compared with classroom exercises▶ Initial understanding of the problem. Checking details with the systems analyst▶ Create algorithms for real problems▶ Comparison of different algorithmic methods - flowcharts, pseudo-code, decision tables, Jackson charts. Advantages and disadvantages of each▶ Define structured programming and construct. The three main constructs – sequence, selection, iteration. Top down programming▶ Modular programming. How modular program can be implemented. Advantages and disadvantages of their use▶ Prototyping. Advantages and disadvantages of its use	
Input and Output of Data	
<ul style="list-style-type: none">▶ Data types and the operations that can be performed with each▶ Keyboard entry of data. Handling and correcting invalid data▶ Standard output layouts. Invoices. Account ledgers▶ Design a layout for a given situation – this must be workable in the real world▶ Differences between output on a screen and a printer	

Filing Data

- ▶ The need for files. The consequences of filing systems NOT being available
- ▶ File structure. Organisation and access methods. An appreciation that a file might be accessed for more than one purpose and so determining the method of organisation
- ▶ Programming for serial and sequential files. Commands relating to file handling – open, close, read, write, check end of file, append
- ▶ Programming to locate records from the whole file that satisfy a given condition
- ▶ Programming to accumulate values from each record in a file
- ▶ Programming to merge two similar files into one
- ▶ Sequential master file update from an unsorted transaction file – candidates will not be expected to program for this

Handling Data in Memory

- ▶ Variables – rules for naming variables/procedures/functions
- ▶ Performing calculations
- ▶ Decisions – IF, CASE
- ▶ Loops. Difference between the three main looping features and WHEN to use them
 - i) FOR/ENDFOR for fixed number of repeats
 - ii) REPEAT/UNTIL for variable repeats – the process is always executed at least once – test for exit at the end
 - iii) WHILE/ENDWHILE for variable repeats – the process may not execute even the first time in rare situations – test for exit at the beginning. Use of data TERMINATORS
- ▶ Arrays – 1-dimensional and 2-dimensional
 - i) Read all data into an array
 - ii) Output all data from an array
 - iii) Search an array for a given value
 - iv) Accumulate values held in some elements of an array
 - v) Use one array to find data to access another
- ▶ Text data – extract character(s) from a string. Joining strings

Procedures/Sub Routines and Functions

- ▶ Use of procedures for structuring and re-use processes. Library of procedures/functions
- ▶ Parameter passing. Calling a procedure. How parameters are handled internally
- ▶ Difference between procedures and functions
- ▶ Standard functions such as:
 - i) Numeric –SQRT, ABS, INT, RANDOM, SIN/COS/TAN
 - ii) String – LEFT, RIGHT, ASC, VALUE (The names may vary in different languages)

Testing

- ▶ Plan the structure of test data for a program
- ▶ Design test data for valid and invalid situations
- ▶ Perform a dry run/desk check using test data and an algorithm – lay out the results in table format showing the value of variables ONLY as they change
- ▶ Programming to test invalid conditions AND subsequent repeated re-entry after data is rejected until it is finally accepted

- ▶ Testing by program. Recording the results in a test log. Levels of testing – module, program, system, user acceptance
- ▶ Methods of locating errors of logic – dry run, trace routines, test bed routines, temporary print commands inserted
- ▶ Difference between syntax and logic errors. How and when syntax and logic errors are detected and corrected

Documentation

- ▶ The need for documentation
- ▶ Documentation for the maintenance programmer
- ▶ Documentation for the user
- ▶ The reasons why user and maintenance programmer documentations are different
- ▶ Uses and benefits of comments/annotations in program listings

Learning Outcomes for the Unit:

At the end of this Unit, students will be able to:

1.	Develop, write and test high level language programs.
2.	Appreciate the need for low-level (Assembly) languages.
3.	Structure a computer program appropriately using looping, arrays and sub-routines.
4.	Use appropriate measures to thoroughly test programs.
5.	Provide effective user documentation to support programs.

The numbers in the boxes below show which of the above module learning outcomes are related to particular cognitive and key skills:

Knowledge & Understanding	Analysis	Synthesis /Creativity	Evaluation	Interactive & Group Skills
1, 2	3, 4	1, 2	2	1, 3, 5
Self-appraisal/ Reflection on Practice	Planning and Management of Learning	Problem Solving	Communication & Presentation	Other skills (please specify):
1, 2, 4, 5	1-5	1, 3, 4	1, 5	-

Learning and teaching methods/strategies used to enable the achievement of learning outcomes:

Learning takes place on a number of levels through lectures, class discussion including problem review and analysis. Formal lectures provide a foundation of information on which the student builds through directed learning and self managed learning outside of the class. The students are actively encouraged to form study groups to discuss course material which fosters a greater depth learning experience.

Assessment methods which enable the student to demonstrate the learning outcomes for the Unit:		Weighting:
<p>Examination: 3 hours duration</p> <p>The paper will be split into two parts:</p> <p>Section A: Compulsory section accounting for 40% of the paper / short questions requiring high-level programming code with good syntax</p> <p>Section B: Candidates choose 4 questions from 7, each question is worth 15% of the marks / these questions will include the design of FULL test data for a given situation, dry run of a given pseudo-code routine using given data, develop a pseudo-code algorithm for a given situation</p>		100%
Indicative Reading for this Unit:		
Main Text		
No set textbook		
Course Materials are available on the ICM website www.icm.education		
Alternative Texts and Further Reading		
Appropriate manuals for the chosen programming language		
Guideline for Teaching and Learning Time (10 hrs per credit):		
50 hours	Lectures / Seminars / Tutorials / Workshops	
	Tutorial support includes feedback on assignments and may vary by college according to local needs and wishes.	
50 hours	Directed learning	
	Advance reading and preparation/Class preparation/Background reading/Group study/Portfolio/Diary etc.	
100 hours	Self managed learning	
	Working through the course text and completing assignments as required will take up the bulk of the learning time. In addition students are expected to engage with the tutor and other students and to undertake further reading using the web and/or libraries	

13.1.5 Applications Syllabus

Unit Title	Applications
Unit Code	AP-0908
Level	5 Diploma
Credits	20
Unit Leader	MJ
Pre-requisites	
Main Aim(s) of the Unit:	
<p>This unit will introduce a wide range of business applications and will improve the students understanding of such systems in a real situation. Applications of systems involving a large number of records will be introduced. The student will gain a good understanding of the meaning of data in different contexts.</p> <p><i>(Note: This unit does not examine in detail the use of off-the-shelf applications packages such as spreadsheets, databases, etc.)</i></p>	
Main Topics of Study:	
<p>General</p> <ul style="list-style-type: none"> ▶ Define package, program, application and data ▶ Benefits and limitations of different data capture methods to the business and to the client ▶ Data capture forms (screen and paper) – in this case, an awareness that screen is an output device confirming inputs ▶ Outputs (printed and screen). Selection of appropriate form of output. Billing layouts ▶ Distinction between on-line direct access and batch runs ▶ Process diagrams. Systems flowchart or Data flow diagrams could be used but a formal diagram is not expected – the requirements are that candidates are aware of the sequence of events including rectifying errors ▶ Back-up systems needed including restart processes where a lengthy print run may fail in mid run because of a printer failure <p>Applications</p> <p>Thorough investigation of each of the following applications:</p> <ul style="list-style-type: none"> ▶ Mail order and customer accounts ▶ Stock control ▶ Supermarket sales ▶ Library administration ▶ Public utility companies administration ▶ Hotel administration and bookings ▶ Banking related to customer accounts ▶ Club membership ▶ Estate agency (real estate) administration <p>Such an investigation of each of the above applications should cover the aspects listed below:</p> <ul style="list-style-type: none"> ▶ Overall purpose of the application 	

- ▶ The role of the people involved
- ▶ The detailed format of the sources data for each aspect of the application
- ▶ The method of data capture for each type of input. Devices suitable for this
- ▶ The processes that operate in the business – systems diagrams. Batch or on-line
- ▶ The filing systems required including contents of each file and methods of organisation and access
- ▶ The outputs that are produced
- ▶ The devices required for each type of output
- ▶ How each output will be used and possible follow-ups

Learning Outcomes for the Unit:

At the end of this Unit, students will be able to:

1.	Evaluate a specific business system.
2.	Identify required inputs and outputs.
3.	Analyse the data format requirements of systems.
4.	Describe the required processing for a complete business system.
5.	Identify the roles of people involved in the system.

The numbers in the boxes below show which of the above module learning outcomes are related to particular cognitive and key skills:

Knowledge & Understanding	Analysis	Synthesis /Creativity	Evaluation	Interactive & Group Skills
2, 4, 5	3	1, 3	1	4, 5
Self-appraisal/ Reflection on Practice	Planning and Management of Learning	Problem Solving	Communication & Presentation	Other skills (please specify):
4	1-5	-	2, 4, 5	-

Learning and teaching methods/strategies used to enable the achievement of learning outcomes:

Learning takes place on a number of levels through lectures, class discussions, including problem review and analysis. Formal lectures provide a foundation of knowledge on which students build through directed learning and self managed learning outside of the class. The students are actively encouraged to form study groups to discuss course material, which fosters a greater depth learning experience.

Assessment methods which enable the student to demonstrate the learning outcomes for the Unit:	Weighting:
Examination: 3 hours duration	100%

Indicative Reading for this Unit:

Main Text

No set textbook

Course Materials are available on the ICM website www.icm.education

Alternative Texts and Further Reading

Computer Science for Advanced Level, R. Bradley, Stanley Thornes

Guideline for Teaching and Learning Time (10 hrs per credit):	
50 hours	<p>Lectures / Seminars / Tutorials / Workshops</p> <p>Tutorial support includes feedback on assignments and may vary by college according to local needs and wishes.</p>
50 hours	<p>Directed learning</p> <p>Advance reading and preparation / Class preparation / Background reading / Group study / Portfolio / Diary etc.</p>
100 hours	<p>Self managed learning</p> <p>Working through the course text and completing assignments as required will take up the bulk of the learning time. In addition students are expected to engage with the tutor and other students and to undertake further reading using the web and/or libraries.</p>

13.1.6 Number & Logic Syllabus

Unit Title	Number & Logic
Unit Code	NL 0613
Level	5 Diploma
Credits	20
Unit Leader	LH
Pre-requisites	
Main Aim(s) of the Unit:	
<p>This unit provides an overview of the numeric processes that computers perform and also some of the numerical methods that are commonly solved by computers. The conversion of values from one number system to another will be introduced and students will be able to perform arithmetic operations totally in both binary and in hexadecimal. Other approaches to handling numbers are also considered including iterative methods, number progressions and basic statistical methods.</p>	
Main Topics of Study:	
Number Systems	
<ul style="list-style-type: none">▶ Definition of a general number system. The common rules of decimal, binary, octal and hexadecimal. From these, formulate the general rules for a number system with base N▶ Definition of bit, byte, character, word as basic storage units▶ Methods to convert between decimal, binary, octal and hexadecimal integers▶ Methods to convert between decimal, binary, octal and hexadecimal fractions▶ The special relationship between binary and octal and hexadecimal	
Arithmetic Operations	
<ul style="list-style-type: none">▶ Addition, subtraction, multiplication and division performed TOTALLY within with binary, octal or hexadecimal systems▶ Given that 10 is approximately 2 to the power $3\frac{1}{3}$, work out how many binary places are equivalent to a given number of decimal places	
Use of Memory	
<ul style="list-style-type: none">▶ Representing binary numbers in bytes and words. Normally only 8 or 16 bit-words will be used in numeric questions to reduce the working▶ 2's complement method of holding negative numbers. The ACTUAL NUMERIC VALUE of the sign bit in a 2's complement number▶ Representing fractional values in memory. Floating point numbers. Normalisation of floating point numbers. Determine how a decimal number would be held in binary in float point form including negative numbers. Determine the decimal value of a floating-point binary number▶ Fixed point representation of mixed integer and fractional numbers – normally the mid-point will be the implied binary point▶ How memory holds non-numeric data. ASCII. Binary Coded Decimal. Methods of holding variable length string data▶ Format of an instruction in a binary word. A simplified form is normally tested which includes<ol style="list-style-type: none">i) operation codeii) register number andiii) single address	

Matrix Notation

- ▶ How a 2-D matrix is held in 1-D memory
- ▶ Basic rules for adding, subtraction and multiplying matrices
- ▶ Develop an algorithm for adding, subtracting or multiplying two matrices
- ▶ Determine the inverse of a 2x2 or 3x3 matrix
- ▶ Matrix method of solving simultaneous equations

Iterative Methods

- ▶ Iteration as the idea of 'homing-in' to provide an accurate answer as required. Understand how far to go to determine an answer to the required number of figures/decimal places
- ▶ Understand that an iterative equation could converge to an answer or diverge away from it. Means of determining whether a particular iterative equation will converge for a given problem, e.g. an equation may have two solutions (near $x=2$ and $x=4$). to solve for the solution near $x=2$, one particular iterative equation might converge near $x=2$ but another might diverge or home in on the solution near $x=4$
- ▶ Practical applications of iteration such as:
 - i) Newton-Raphson method to determine the square root of a number
 - ii) Determine the reciprocal of a number ($1/N$)
 - iii) Solve an equation up to degree four by an iterative method
 - iv) Solve simultaneous equations by an iterative method

Other Numerical Methods

- ▶ Graphical method of finding the 'best fit' (linear programming). Determine inequalities in a linear programming problem. Plot suitable lines graphically to represent the built-in restrictions. Plot a suitable line to maximise or minimise (e.g. minimum costs or maximum profit). Alternatively, candidates can use the Simplex method to solve a problem
- ▶ Venn diagrams. Application to real problems
- ▶ Apply a given process to determine the best fit – the method will be defined on the examination papers, e.g. best route to take between different points

Financial

- ▶ Arithmetic and geometric series. Determine the n th term and sum of n terms for each
- ▶ Application to financial situations – discount and depreciation. Inflation
- ▶ Interest – simple and compound
- ▶ Economic order quantity (EOQ)

Statistics

- ▶ Averages – definitions of mean, median, mode, range, inter-quartile range, frequency
- ▶ Calculation of averages for a set of numbers including data held in a frequency table. Determine the best average to use in a given situation
- ▶ Calculation of averages for tabular data with class intervals
- ▶ Dispersion. Standard deviation. Skewness. Normal distribution. Correlation treated non-numerically
- ▶ Probability. Definition. Simple problems involving:
 - i) Mutually exclusive events – the probability of either occurring
 - ii) Independent events – Probability of both occurring
 - iii) Conditional probability – probability of x given y has occurred = $P(x|y)$. Bayes theorem

<ul style="list-style-type: none"> ▶ Expected value ▶ Permutations and combinations. Simple problems 																				
Learning Outcomes for the Unit:																				
At the end of this Unit, students will be able to:																				
1. Handle binary and other number systems related to computer usage.																				
2. Describe how data is held in memory.																				
3. Use iterative approaches to solve simple mathematical problems.																				
4. Solve problems using techniques such as linear programming and Venn diagrams.																				
5. Use basic statistics in the description and analysis of data.																				
The numbers in the boxes below show which of the above module learning outcomes are related to particular cognitive and key skills:																				
<table border="1"> <thead> <tr> <th>Knowledge & Understanding</th> <th>Analysis</th> <th>Synthesis /Creativity</th> <th>Evaluation</th> <th>Interactive & Group Skills</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>3, 4, 5</td> <td>1, 3, 4, 5</td> <td>-</td> <td>1, 3, 4, 5</td> </tr> <tr> <th>Self-appraisal/ Reflection on Practice</th> <th>Planning and Management of Learning</th> <th>Problem Solving</th> <th>Communication & Presentation</th> <th>Other skills (please specify):</th> </tr> <tr> <td>3, 4, 5</td> <td>1-5</td> <td>3, 4</td> <td>2, 3, 4, 5</td> <td>-</td> </tr> </tbody> </table>	Knowledge & Understanding	Analysis	Synthesis /Creativity	Evaluation	Interactive & Group Skills	2	3, 4, 5	1, 3, 4, 5	-	1, 3, 4, 5	Self-appraisal/ Reflection on Practice	Planning and Management of Learning	Problem Solving	Communication & Presentation	Other skills (please specify):	3, 4, 5	1-5	3, 4	2, 3, 4, 5	-
Knowledge & Understanding	Analysis	Synthesis /Creativity	Evaluation	Interactive & Group Skills																
2	3, 4, 5	1, 3, 4, 5	-	1, 3, 4, 5																
Self-appraisal/ Reflection on Practice	Planning and Management of Learning	Problem Solving	Communication & Presentation	Other skills (please specify):																
3, 4, 5	1-5	3, 4	2, 3, 4, 5	-																
Learning and teaching methods/strategies used to enable the achievement of learning outcomes:																				
Learning takes place on a number of levels through lectures, class discussion including problem review and analysis. Formal lectures provide a foundation of information on which the student builds through directed learning and self managed learning outside of the class. The students are actively encouraged to form study groups to discuss course material which fosters a greater depth learning experience.																				
Assessment methods which enable the student to demonstrate the learning outcomes for the Unit:	Weighting:																			
Examination: 3 hours duration	100%																			
Indicative Reading for this Unit:																				
Main Text																				
No set textbook																				
Course Materials are available on the ICM website www.icm.education																				
Alternative Texts and Further Reading																				
Quantitative Techniques, 6th edition, T. Lucey, Thomson																				
Computer Science for Advanced Level, 4th edition, R. Bradley, Stanley Thornes																				

Guideline for Teaching and Learning Time (10 hrs per credit):	
50 hours	<p>Lectures / Seminars / Tutorials / Workshops</p> <p>Tutorial support includes feedback on assignments and may vary by college according to local needs and wishes.</p>
50 hours	<p>Directed learning:</p> <p>Advance reading and preparation / Class preparation / Background reading / Group study / Portfolio / Diary etc.</p>
100 hours	<p>Self managed learning</p> <p>Working through the course text and completing assignments as required will take up the bulk of the learning time. In addition students are expected to engage with the tutor and other students and to undertake further reading using the web and/or libraries.</p>

13.1.7 Programming Project Syllabus

Unit Title	Programming Project			
Unit Code	PP-0908			
Level	5 Diploma			
Credits	20			
Unit Leader	LH			
Pre-requisites				
Main Aim(s) of the Unit:				
The aim of the project is to facilitate the application of programming skills in the development of a real-life situation (normally related to local business) and to extend the student's experience of programming. The student will identify a specific complex problem and produce a working solution to that problem. (See website www.icm.education to view the overview and sequence of events.)				
Main Topics of Study:				
Students will build on the knowledge gained in earlier units and this project will enable the demonstration of a range of knowledge and skills including:				
<ul style="list-style-type: none"> ▶ Project identification ▶ Analysing a real-life situation ▶ Designing the system in relation to specific elements such as input, output, file structures and procedures ▶ Developing a computer program in a suitable programming language ▶ Incorporating test procedures for the program ▶ Producing appropriate documentation 				
Learning Outcomes for the Unit:				
At the end of this Unit, students will be able to:				
1.	Analyse a given business problem or issue.			
2.	Design an appropriate system to resolve the identified problem(s).			
3.	Develop a program using an appropriate high-level language.			
4.	Design and develop appropriate documentation for the system.			
5.	Evaluate the complete process and provide recommendations for further enhancements.			
The numbers in the boxes below show which of the above module learning outcomes are related to particular cognitive and key skills:				
Knowledge & Understanding	Analysis	Synthesis /Creativity	Evaluation	Interactive & Group Skills
2, 3, 4	1	1, 2, 3, 4, 5	5	1, 2, 3, 4, 5
Self-appraisal/ Reflection on Practice	Planning and Management of Learning	Problem Solving	Communication & Presentation	Other skills (please specify):
1, 5	1	2, 3, 4	2, 4	-

Learning and teaching methods/strategies used to enable the achievement of learning outcomes:	
Learning takes place on a number of levels through lectures, class discussion including problem review and analysis. Formal lectures provide a foundation of information on which the student builds through directed learning and self managed learning outside of the class. The primary activity will be student-centred and will involve self-managed practical work.	
Assessment methods which enable the student to demonstrate the learning outcomes for the Unit:	Weighting:
Program and documentation	100%
Indicative Reading for this Unit:	
Main Text	
Programming Manuals	
Course Materials are available on the ICM website www.icm.education	
Guideline for Teaching and Learning Time (10 hrs per credit):	
50 hours	Lectures / Seminars / Tutorials / Workshops Tutorial support includes feedback on assignments and may vary by college according to local needs and wishes.
50 hours	Directed learning Advance reading and preparation / Class preparation / Background reading / Group study / Portfolio / Diary etc.
100 hours	Self managed learning Working through the course text and completing assignments as required will take up the bulk of the learning time. In addition students are expected to engage with the tutor and other students and to undertake further reading using the web and/or libraries.

13.1.8 Systems Analysis Syllabus

Unit Title	Systems Analysis
Unit Code	SA-0908
Level	5 Diploma
Credits	20
Unit Leader	LH
Pre-requisites	
Main Aim(s) of the Unit:	
This unit describes the processes involved in the analysis, design and implementation of new or upgraded computer systems. The unit will explore the basic stages involved in the systems life cycle. Other issues will be considered including privacy and security, the importance of appropriate and comprehensive documentation, and characteristics of common data handling systems.	
Main Topics of Study:	
Overview	
<ul style="list-style-type: none">▶ The need for systems analysis for business systems▶ The role of the systems analyst▶ The role of other people in defining a new system and updating an existing one▶ Differences between the development of a new system and a MAJOR upgrade of an existing system▶ SSADM – an overview. CASE tools	
Systems Life Cycle	
<ul style="list-style-type: none">▶ The sequence of stages in the life cycle. Time scales▶ Initial Investigation▶ Feasibility Study. Initial briefing statement. Contents of the report. Possible management decisions on reading and discussing the report. Cost/benefit analysis. User needs▶ Analysis stage. Investigations into current systems through questionnaires, interviews, observation of everyday usage, documentation. Evaluation of the relative merits of these methods. Who to interview. Techniques for maximising information. Identifying the main processes needed. Recording the results▶ Design stage▶ Implementation stage. Program production or acquisition. Testing methods. Training. Documentation completion. Hand-over. For system upgrade - methods of file conversion and changeover▶ Maintenance & Review. Reasons for each. Differences between them. How each is completed and by whom and when	
Recording the Findings for the System	
Students may be required to draw one of the charts/tables for a given system during the examination	
<ul style="list-style-type: none">▶ E-R diagrams and associated terms▶ Data flow diagrams▶ System flow-charts▶ Decision tables	

- ▶ Progress/testing charts. Gantt charts
- ▶ Deciding which is the most appropriate chart to use

Design

- ▶ Deciding the most appropriate data capture method for a given system
- ▶ Data-entry form design. Factors that make a form effective and user friendly?
- ▶ The need for data to be coded. The advantages of data coding. Types of data codes – sequence, block, faceted, hierarchical. Coding data for a given application. Check digit systems
- ▶ Output design. Making screen outputs effective and user friendly. Limitations of screen output
- ▶ Printout design. Standard outputs (e.g. the invoice, account statement)
- ▶ Identify necessary files, organisation method and access method. Identify files that must be accessed for different purposes and the subsequent effect this has on organisation method
- ▶ Identify contents of each file
- ▶ Plan and schedule the development process. Deciding the method of obtaining programs and language/platform to be used

Implementation

- ▶ Analyse initial briefing of the programming team. Subsequent collaboration between analyst and programmer. Time scales and planning
- ▶ Analyst role in testing. Test plan. Design of test data. Testing log. Testing at different levels – module, program, system, and user-acceptance
- ▶ Training of users. Production of documentation

Software Acquisition Methods

- ▶ Purchase and customise standard software
- ▶ Develop a database and associated processes
- ▶ Commission a software house
- ▶ Write in-house programs
- ▶ Prototyping
- ▶ Comparison of the above methods – advantages and disadvantages

Security and Privacy

- ▶ Define privacy as the need to build in safeguards for the data subjects
- ▶ Define security as the need to safeguard hardware, software and data
- ▶ Building realistic security into a system. The differences between small and large business security systems
- ▶ Use of passwords and encryption for privacy
- ▶ Methods to secure hardware, software and data

Documentation

- ▶ System specification and its contents
- ▶ Program specification and its contents
- ▶ User documentation and its contents. Maintenance documentation and its contents. The differences between these three

Characteristics of Common Systems

- ▶ Describe the main elements of the following processes:
 - i. File sort
 - ii. Merging of files
 - iii. Search files for records which meet a given condition
 - iv. Produce a printed report following a search
- ▶ Identify methods of data capture, main processing, required outputs, files (contents, organisation and access), manual processes and people involved for:
 - i. Stock control
 - ii. Retail systems
 - iii. Mail-ordering systems
 - iv. Staff payroll and personnel records
 - v. Medical records
 - vi. Library administration
 - vii. Club membership

Learning Outcomes for the Unit:

At the end of this Unit, students will be able to:

1.	Describe the stages of computer systems development including analysis, design, development and implementation.
2.	Evaluate appropriate approaches to software acquisition.
3.	Compare appropriate privacy and security measures in different systems.
4.	Describe the main elements of file processing across a range of applications.

The numbers in the boxes below show which of the above module learning outcomes are related to particular cognitive and key skills:

Knowledge & Understanding	Analysis	Synthesis /Creativity	Evaluation	Interactive & Group Skills
1, 3, 4	1	1, 2, 3	2	1, 3
Self-appraisal/ Reflection on Practice	Planning and Management of Learning	Problem Solving	Communication & Presentation	Other skills (please specify):
1, 3	1-4	1, 3	1, 4	-

Learning and teaching methods/strategies used to enable the achievement of learning outcomes:

Learning takes place on a number of levels through lectures, class discussion including problem review and analysis. Formal lectures provide a foundation of information on which the student builds through directed learning and self managed learning outside of the class. The students are actively encouraged to form study groups to discuss course material which fosters a greater depth learning experience.

Assessment methods which enable the student to demonstrate the learning outcomes for the Unit:	Weighting:
Examination: 3 hours duration	100%

Indicative Reading for this Unit:

Main Text

No set textbook

Course Materials are available on the ICM website www.icm.education

Alternative Texts and Further Reading

Systems Analysis and Design, 2nd edition, Donald Yeates & Tony Wakefield, Prentice Hall

Computer Science for Advanced Level, 4th edition, Ray Bradley, Nelson Thornes

Guideline for Teaching and Learning Time (10 hrs per credit):

50 hours	Lectures / Seminars / Tutorials / Workshops Tutorial support includes feedback on assignments and may vary by college according to local needs and wishes.
50 hours	Directed learning Advance reading and preparation / Class preparation / Background reading / Group study / Portfolio / Diary etc.
100 hours	Self managed learning Working through the course text and completing assignments as required will take up the bulk of the learning time. In addition students are expected to engage with the tutor and other students and to undertake further reading using the web and/or libraries.

13.1.9 Feasibility Study Syllabus

Unit Title	Feasibility Study			
Unit Code	FS-0908			
Level	6 Diploma			
Credits	20			
Unit Leader	LH			
Pre-requisites				
Main Aim(s) of the Unit:				
Students undertaking this unit need to select a specific computer project. This is likely to relate to a particular local organisation or company and will be used to analyse and solve a given problem.				
Main Topics of Study:				
The Feasibility Study will include areas such as:				
<ul style="list-style-type: none"> ▶ Terms of reference ▶ Details and problems of the current system ▶ Study methodology ▶ Possible solutions and recommendations including a description of the costs and benefits 				
Learning Outcomes for the Unit:				
At the end of this Unit, students will be able to:				
1.	Implement techniques learnt in other units to formulate potential solutions.			
2.	Integrate knowledge from a wide range of sources.			
3.	Write a concise report addressing the key issues.			
4.	Analyse a range of solutions to make informed recommendations.			
5.	Manage their own time and resources in the completion of the report.			
The numbers in the boxes below show which of the above module learning outcomes are related to particular cognitive and key skills:				
Knowledge & Understanding	Analysis	Synthesis /Creativity	Evaluation	Interactive & Group Skills
1, 2, 3	4	1, 2, 5	1, 2, 3	1, 3, 5
Self-appraisal/ Reflection on Practice	Planning and Management of Learning	Problem Solving	Communication & Presentation	Other skills (please specify):
1, 2, 5	1-5	1, 4	3	-

Learning and teaching methods/strategies used to enable the achievement of learning outcomes:	
Learning takes place on a number of levels through lectures, class discussion including problem review and analysis. Formal lectures provide a foundation of information on which the student builds through directed learning and self managed learning outside of the class. The students are actively encouraged to form study groups to discuss course material which fosters a greater depth learning experience.	
Assessment methods which enable the student to demonstrate the learning outcomes for the Unit:	Weighting:
Written Report (Note: 25% of the overall mark may be obtained from presenting the report to a local independent panel)	100%
Indicative Reading for this Unit:	
Main Text: Material relating to the target organisation, e.g. company reports Study Notes are available on the ICM website www.icm.education	
Guideline for Teaching and Learning Time (10 hrs per credit):	
50 hours	Lectures / Seminars / Tutorials / Workshops Tutorial support includes feedback on assignments and may vary by college according to local needs and wishes.
50 hours	Directed learning Advance reading and preparation / Class preparation / Background reading / Group study / Portfolio / Diary etc.
100 hours	Self managed learning Working through the course text and completing assignments as required will take up the bulk of the learning time. In addition students are expected to engage with the tutor and other students and to undertake further reading using the web and/or libraries.

13.1.10 Hardware & Operating Systems Syllabus

Unit Title	Hardware & Operating Systems
Unit Code	HOS-0908
Level	6 Diploma
Credits	20
Unit Leader	PS
Pre-requisites	
Main Aim(s) of the Unit:	
<p>This unit will provide an overview of hardware systems including technical specifications of input and output devices, memory and storage. Students should be able to produce a simple 'pseudo code' to illustrate how data is handled in the processor. Further details are provided on operating systems and their function.</p>	
Main Topics of Study:	
<p>Memory</p> <ul style="list-style-type: none"> ▶ Types of main memory. ROM, RAM, DRAM, SRAM, EPROM, EEPROM, Registers, Cache ▶ Survey of relative speeds and costs of memory from fast registers to slow secondary memory (tape). Read and write cycle of memory ▶ Technical characteristics of types of main memory ▶ Memory maps ▶ Address bus. Operation codes. Reduced Instruction Set Codes (RISC). Decoding addresses <p>CPU</p> <ul style="list-style-type: none"> ▶ Von Neumann model of the stored program ▶ Developments on this model – pipelining, array processors, multiprocessors ▶ Component parts of the CPU ▶ BIOS ▶ Data bus and address bus in relation to other parts of the computer system ▶ Registers. Accumulator(s), MAR, MBR, CIR, PC. Register transfer language (listed below) ▶ Simplified instruction set. A subset is listed at the end of this syllabus ▶ Shift and mask instructions used to extract/combine parts of data in a single location ▶ Addressing modes – immediate, direct, indirect, indexed <p>Fetch-Execute Cycle</p> <ul style="list-style-type: none"> ▶ Overview of the cycle ▶ Taken in turn, how each of the basic registers are used throughout the fetch-execute cycle. Use of register transfer language to describe these operations ▶ Complete analysis of a 3-instruction assembly routine as it passes through the fetch execute cycle – the analysis to be expressed in register transfer language 	

Complex Memory Structures

- ▶ Stack. Limitations of stacks. PUSH and POP. Recursion – simple examples such as determining factorial 5 ($5! = 5 \times 4 \times 3 \times 2 \times 1$) by a recursive method
- ▶ Queue. Holding a queue in memory – circular queue using an array Algorithm to add or remove an item from a queue
- ▶ Linked list. Algorithms to locate, delete or insert an item using a linked list
- ▶ Binary tree. Algorithms to locate, delete or insert an item using a binary tree

Input Devices

- ▶ Survey of current input devices available – keyboard, concept keyboard, barcode reader, optical mark sense reader, optical character reader, magnetic ink character reader, digitiser
- ▶ Technical aspects of how each of the above devices read their inputs. This includes being able to locate the position of the data on the capture form. Candidates need to see samples
- ▶ Buffers. Double buffering

Output Devices

- ▶ Survey of the range of printers. Comparison of the features offered by each type of printer
- ▶ Technical aspects of how each type converts the data it receives into printed output
- ▶ VDU. Video RAM. Colour. Raster scanning. Graphics card
- ▶ Plotters – Flat bed, drum. Their operations

Storage Devices and Media

- ▶ Difference between device and medium. Role of the buffer in data transfer
- ▶ Survey of storage devices. Magnetic tape, cartridge and tape streamer. Diskette, hard disk, Winchester. USB pen drive. Range of optical devices – CD and DVD
- ▶ Definitions of storage terms – file, record, field, cylinder, track, sector, header label, inter-block gap. File Allocation Table (FAT)
- ▶ How data is physically stored on a storage medium
- ▶ How each of the storage devices read and records data
- ▶ Data transfer checks. Parity and its purpose. Odd/even parity – be able to give numeric examples of parity checking showing acceptance/failure. Cyclic redundancy checks

Logic Devices and Boolean Algebra

- ▶ AND, OR, NOT. Truth tables. Karnaugh maps
- ▶ Boolean algebra laws – associative, commutative, de Morgan's Theorem
- ▶ Simplification of Boolean expressions and proving identities using truth tables, Karnaugh maps, and algebraic manipulation
- ▶ Devise simple circuits for Boolean expressions. Half and full adders
- ▶ Conversion of expressions into NAND or NOR units
- ▶ Flip-flops and their uses

Operating System

Basic commands are covered in **general purpose software** unit:

- ▶ Range of operating systems now in use – DOS, Windows and UNIX. Means of control using GUI or commands
- ▶ Purpose of the operating system. General survey of features offered
- ▶ Interrupt handling. Priorities. Interrupt vector table
- ▶ Scheduling – high, medium and low level

- ▶ Memory management. Partitioning. Paging. Virtual memory
- ▶ File management
- ▶ Multiprogramming. Concurrent processing. Deadlock and locking

Learning Outcomes for the Unit:

At the end of this Unit, students will be able to:

1.	Explain how input and output devices work.
2.	Evaluate a range of storage devices and methods of data handling.
3.	Understand how internal logic is handled.
4.	Describe the primary functions of operating systems and how they are carried out.
5.	Produce simple algorithms for data handling.

The numbers in the boxes below show which of the above module learning outcomes are related to particular cognitive and key skills:

Knowledge & Understanding	Analysis	Synthesis /Creativity	Evaluation	Interactive & Group Skills
1, 3, 4	5	2, 3, 5	2	2, 5
Self-appraisal/ Reflection on Practice	Planning and Management of Learning	Problem Solving	Communication & Presentation	Other skills (please specify):
2, 4	1-5	3	4, 5	-

Learning and teaching methods/strategies used to enable the achievement of learning outcomes:

Learning takes place on a number of levels through lectures, class discussion including problem review and analysis. Formal lectures provide a foundation of information on which the student builds through directed learning and self managed learning outside of the class. The students are actively encouraged to form study groups to discuss course material which fosters a greater depth learning experience.

Assessment methods which enable the student to demonstrate the learning outcomes for the Unit: Weighting:

Examination: 3 hours duration	100%
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Indicative Reading for this Unit:

Main Text

No set textbook

Course Materials are available on the ICM website www.icm.education

Alternative Texts and Further Reading

The Principles of Computer Hardware, 3rd edition, A. Clements, Oxford University Press

Computer Science for Advanced Level, 4th edition, R. Bradley, Stanley Thornes

Operating Systems incorporating UNIX and WINDOWS, 3rd edition, Colin Ritchie, Letts

Guideline for Teaching and Learning Time (10 hrs per credit):	
50 hours	<p>Lectures / Seminars / Tutorials / Workshops</p> <p>Tutorial support includes feedback on assignments and may vary by college according to local needs and wishes.</p>
50 hours	<p>Directed learning</p> <p>Advance reading and preparation / Class preparation / Background reading / Group study / Portfolio / Diary etc.</p>
100 hours	<p>Self managed learning</p> <p>Working through the course text and completing assignments as required will take up the bulk of the learning time. In addition students are expected to engage with the tutor and other students and to undertake further reading using the web and/or libraries.</p>

13.1.11 Managing Computer Systems Syllabus

Unit Title	Managing Computer Systems
Unit Code	MCS-0908
Level	6 Diploma
Credits	20
Unit Leader	LH
Pre-requisites	
Main Aim(s) of the Unit:	
<p>This unit introduces organisational structures and some general management principles but concentrates on management in an IT/computing context. The unit considers roles of people in real business situations and how they are managed for effective processing. The unit also considers the management role in setting up appropriate security systems and monitoring them to ensure their effectiveness.</p>	
Main Topics of Study:	
<p>Organisational Structures</p> <ul style="list-style-type: none"> ▶ Hierarchical structures in business ▶ Matrix structures in business ▶ Management by objectives ▶ Centralisation of a business. Affects of decentralisation <p>General Management Principles</p> <ul style="list-style-type: none"> ▶ Management control of a business ▶ Planning and scheduling ▶ Time management ▶ Reporting method. Reporting to management ▶ Communication channels in business ▶ Motivation <p>Information</p> <ul style="list-style-type: none"> ▶ Distinction between data and information ▶ Information at different levels – operational, tactical, strategic ▶ Presenting information – different methods ▶ What makes ‘good’ information? ▶ Form and report design <p>Business Processes</p> <ul style="list-style-type: none"> ▶ Forecasting ▶ Budgeting ▶ Decision systems. Executive information systems. Decision support systems. Expert systems ▶ IT aids for the manager 	

Network Analysis/PERT

- ▶ Network analysis as a means of project control
- ▶ Definitions of activity, event, critical path, float, dummy activity. activity resources
- ▶ Conventions for drawing a network diagram
- ▶ Draw a network from a table of activities
- ▶ Determine critical path and minimum project duration
- ▶ Gantt chart. Draw a Gantt. Aggregating resources within a Gantt chart. Levelling resources over the duration of the project
- ▶ The role of the computer in project control

IT Personnel

The Roles of IT Personnel in the Business – Their Job Descriptions

- ▶ Data processing manager, computer manager
- ▶ Network supervisor/controller
- ▶ Systems analyst
- ▶ Programmer, systems programmer, programmer analyst
- ▶ End users and data clerks

Training and Recruiting

- ▶ Methods of recruiting particularly for IT staff
- ▶ Methods of selection particularly for IT staff
- ▶ Benefits/drawbacks of training existing staff against recruiting new already-trained staff
- ▶ Training needs. Individual training programs. Personnel Development Records (PDR)
- ▶ Means of providing the right training

Security and Privacy of Computer Systems

- ▶ Difference between security and privacy
- ▶ Threats to the security of computer systems – hardware, software and data
- ▶ Means of minimising security problems
- ▶ Privacy issues in business data
- ▶ The manager's role in controlling security and privacy problems

The Effects of Computers on Business

- ▶ Managing changes in business methods
- ▶ Changing role of personnel
- ▶ Changes which affect customers
- ▶ Health issues related to computer use
- ▶ Data Protection Acts and other laws relating to computer systems which affect management and staff

The Small Business

- ▶ Differences in running a small business compared with larger organisations
- ▶ Benefits of IT for the small business related to a particular business
- ▶ Business plans
- ▶ Choosing the right computer system
- ▶ Problems facing the small business with regards to IT
- ▶ Leasing and maintenance contracts

Learning Outcomes for the Unit:

At the end of this Unit, students will be able to:

1.	Describe different organisational structures and general management principles.
2.	Understand the manager’s role in the operation of effective computer systems.
3.	Implement project management techniques and understand the role of key personnel.
4.	Evaluate the manager’s role in changing systems.

The numbers in the boxes below show which of the above module learning outcomes are related to particular cognitive and key skills:

Knowledge & Understanding	Analysis	Synthesis /Creativity	Evaluation	Interactive & Group Skills
1, 2, 3	4	2, 3, 4	4	2, 3
Self-appraisal/ Reflection on Practice	Planning and Management of Learning	Problem Solving	Communication & Presentation	Other skills (please specify):
3	1-4	3	3	-

Learning and teaching methods/strategies used to enable the achievement of learning outcomes:

Learning takes place on a number of levels through lectures, class discussion including problem review and analysis. Formal lectures provide a foundation of information on which the student builds through directed learning and self managed learning outside of the class. The students are actively encouraged to form study groups to discuss course material which fosters a greater depth learning experience.

Assessment methods which enable the student to demonstrate the learning outcomes for the Unit:	Weighting:
Examination: 3 hours duration	100%

Indicative Reading for this Unit:

Main Text

No set textbook

Course Materials are available on the ICM website www.icm.education

Alternative Text

Management Theory and Practice, 5th edition, G.A. Cole, DPP

Quantitative Techniques, 6th edition, T. Lucey, DPP

Management Information Systems, 8th edition, T. Lucey, Letts

Guideline for Teaching and Learning Time (10 hrs per credit):	
50 hours	<p>Lectures / Seminars / Tutorials / Workshops</p> <p>Tutorial support includes feedback on assignments and may vary by college according to local needs and wishes.</p>
50 hours	<p>Directed learning</p> <p>Advance reading and preparation / Class preparation / Background reading / Group study / Portfolio / Diary etc.</p>
100 hours	<p>Self managed learning</p> <p>Working through the course text and completing assignments as required will take up the bulk of the learning time. In addition students are expected to engage with the tutor and other students and to undertake further reading using the web and/or libraries.</p>

13.1.12 Networks Syllabus

Unit Title	Networks
Unit Code	NK-0908
Level	6 Diploma
Credits	20
Unit Leader	PS
Pre-requisites	
Main Aim(s) of the Unit:	
<p>This unit provides an overview of different types of networks and their use in business systems. The importance of the internet and the use of emails and associated applications will be explored. Further details will be included on the development tools associated with web design and the associated security issues.</p>	
Main Topics of Study:	
<p>Types of Networks</p> <ul style="list-style-type: none"> ▶ Definitions of LAN, WAN and the distinction between them ▶ Advantages and disadvantages of networking in general compared with stand-alone systems ▶ Advantages and disadvantages of networking in a particular situation ▶ Definition of bandwidth. Importance of bandwidth ▶ Open Systems Interconnection (OSI) <p>LAN</p> <ul style="list-style-type: none"> ▶ Network topologies – star, bus, ring, peer-peer ▶ Advantages and disadvantages of each of the main types of network ▶ Factors affecting speeds of networks ▶ How signals are passed and controlled in each of the network types ▶ The client-server <p>WAN</p> <ul style="list-style-type: none"> ▶ Analogue and digital signals. Roles of the modem and multiplexer. Time Division Multiplexing (TDM). Frequency Division Multiplexing (FDM). ISDN ▶ Polling individual workstations ▶ Switching techniques – circuit, message, packet ▶ EDI. Uses made by business. Advantages compared with traditional communications ▶ EFT. Uses made by business. Advantages compared with traditional payment methods ▶ ATM usage by banks. The sequence of events within the computer for a successful transaction in technical terms <p>Internet</p> <ul style="list-style-type: none"> ▶ Its origins ▶ Business use of Internet ▶ Uniform Resource Locators (URL). Domain name. Domain name suffix. IP address ▶ Components of the Internet. WWW. Email, file transfer protocol servers, news 	

- ▶ Use of Internet by individuals
- ▶ Use of Internet by business and organisations
- ▶ Setting up your own domain name
- ▶ Search engines. Structuring queries to eliminate irrelevant information
- ▶ Cookies
- ▶ Affects on society – good and bad

Email

- ▶ Registering for email and logging on
- ▶ The email system as seen by the user
- ▶ How to send and receive email. Attachments
- ▶ Options open to the user on receiving an email message

Hypertext Mark-up Language (HTML) and JAVA Script

- ▶ Purpose of the HTML language
- ▶ Format of the HTML language
- ▶ Simple web pages in HTML
- ▶ JavaScript. Applets. Simple examples

Data Transfers

- ▶ Hypertext Transfer Protocol (HTTP)
- ▶ File Transfer Protocol (FTP)
- ▶ Transmission Control Protocol (TCP)
- ▶ JPEG, MPEG formats

Control of a Network and its Security

- ▶ Role of the network supervisor/manager
- ▶ Password systems. Allocation of passwords. Levels of access
- ▶ Network threats. Viruses and their control
- ▶ Hacking. Firewall
- ▶ Encryption. Public key encryption

Learning Outcomes for the Unit:

At the end of this Unit, students will be able to:

1.	Distinguish between different types of network (e.g. LAN and WAN).
2.	Describe in detail the business uses of networks.
3.	Describe techniques and simple procedures used in the design of web pages.
4.	Evaluate security and privacy issues in relation to using networks.

The numbers in the boxes below show which of the above module learning outcomes are related to particular cognitive and key skills:				
Knowledge & Understanding	Analysis	Synthesis /Creativity	Evaluation	Interactive & Group Skills
1, 2, 3	2, 4	1, 2	4	3
Self-appraisal/ Reflection on Practice	Planning and Management of Learning	Problem Solving	Communication & Presentation	Other skills (please specify):
1	1-4	4	2, 3	-
Learning and teaching methods/strategies used to enable the achievement of learning outcomes:				
Learning takes place on a number of levels through lectures, class discussion including problem review and analysis. Formal lectures provide a foundation of information on which the student builds through directed learning and self managed learning outside of the class. The students are actively encouraged to form study groups to discuss course material which fosters a greater depth learning experience.				
Assessment methods which enable the student to demonstrate the learning outcomes for the Unit:				Weighting:
Examination: 3 hours duration				100%
Indicative Reading for this Unit:				
Main Text				
No set textbook				
Course Materials are available on the ICM website www.icm.education				
Alternative Text				
A Level Computing, 5th edition, P.M. Heathcote & S. Langfield, Payne Galloway				
Computer Science for Advanced Level, 4th edition, R. Bradley, Stanley Thornes				
Guideline for Teaching and Learning Time (10 hrs per credit):				
50 hours	Lectures / Seminars / Tutorials / Workshops			
	Tutorial support includes feedback on assignments and may vary by college according to local needs and wishes.			
50 hours	Directed learning			
	Advance reading and preparation / Class preparation / Background reading / Group study / Portfolio / Diary etc.			
100 hours	Self managed learning			
	Working through the course text and completing assignments as required will take up the bulk of the learning time. In addition students are expected to engage with the tutor and other students and to undertake further reading using the web and/or libraries.			