Imperial College London

Programme Specification for the G400 BEng Computing degree.

PLEASE NOTE. This specification provides a <u>concise</u> summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. This specification provides a source of information for students and prospective students seeking an understanding of the nature of the programme and may be used by the College for review purposes and sent to external examiners. More detailed information on the learning outcomes, content and teaching, learning and assessment methods of each module can be found in the course handbook or on-line at <u>http://www3.imperial.ac.uk/computing/</u>. The accuracy of the information contained in this document is reviewed by the College and may be checked by the Quality Assurance Agency.

| 1. | Awarding Institution: | Imperial College London |
|----|--|---|
| 2. | Teaching Institution: | Imperial College London |
| 3. | External Accreditation by Professional / Statutory Body: | BCS - The Chartered Institute for IT and The Institution of Engineering and Technology. |
| 4. | Name of Final Award (BEng / BSc / MEng etc): | BEng |
| 5. | Programme Title (e.g. Biochemistry with Management): | Computing |
| 6. | Name of Department / Division: | Department of Computing |
| 7. | Name of Faculty: | Engineering Faculty |
| 8. | UCAS Code (or other coding system if relevant): | G400 |

9. Relevant QAA Subject Benchmarking Group(s) and/or other external/internal reference points

Engineering (E), Computer Science (C).

10. Level(s) of programme within the Framework for Higher Education Qualifications (FHEQ):

| Bachelor's (BSc, BEng, MBBS) | Level H (Level 6) |
|------------------------------|-------------------|

11. Mode of Study

Full-time

12. Language of Study: English

13. Date of production / revision of this programme specification (month/year):

March 2015

14. Educational aims/objectives of the programme

The programme aims/objectives are to:

•Impart a breadth and depth of understanding of the key concepts in Computing, including their application and extension. (C)

•Enhance the ability of each student to appreciate, and to adapt to, changes in the state of the art in Computing. (C)

•Develop skills in critical independent scholarship. (E), (C)

•Place special emphasis on the fundamental principles underlying Computing and on the understanding of the engineering considerations involved in computing system design,

implementation, application and use. (E), (C)

•Give a solid background in discrete mathematics (logic and computing theory). This provides a formal foundation for computing. (C)

•Give a solid background in the continuous mathematics and statistics relevant to applications in science, engineering and management. (E)

Provide training in the professional aspects of computing as an engineering discipline. (E), (C)
Provide an appreciation of current and emerging technologies in an industrial or commercial context. (E), (C)

•Give students practical experience, through a series of supporting laboratory and problem solving classes and through group and individual project work. (E), (C)

•Develop interpersonal skills to ensure students are effective in future roles they undertake. (E), (C) •Exercise the ability of each student to work as an individual and as part of a team. (E), (C)

15. Programme Learning Outcomes

The curriculum and learning outcomes are consistent with the cognate areas identified in the Computing and Engineering benchmarks. The BEng programme is consistent with the criteria for level H (Honours) in the Framework or higher Education Qualifications (FHEQ) documentation.

1. Knowledge and Understanding

Knowledge and Understanding of:

1. The major paradigms of high-level programming: declarative, imperative and object oriented. (C)

2. Fundamental Computing concepts, including computer hardware, computer architecture, operating systems, programming, program design, fundamental algorithms, compilers, databases, networks and communications, human computer interaction, and many application areas such as e-commerce, graphics and artificial intelligence. (C)

3. The underlying mathematical foundations of Computing, including logic, discrete mathematics, computability, and complexity. (C)

4. Formal aspects of software engineering, including program specification, program reasoning and design methods. (C)

5. Continuous mathematics relevant to a wide range of application areas including computer graphics, operations research, optimisation, performance analysis and scientific computing.

6. Practical aspects of software engineering and engineering design.

7. Communication skills, including project specification, system design, teamwork, written and oral presentation and literature search. (E)

8. Moral and ethical issues, including professional conduct, law and plagiarism.

How achieved:

Acquisition of 1 to 5 and 8 is through a combination of lectures, tutorials and practical work in core and optional courses in all three years.

Acquisition of 6 and 7 is through laboratory work and individual and group projects, with accompanying reports and presentations. Students are encouraged to undertake independent reading to supplement and consolidate what is being learned and to broaden their knowledge and understanding of computing and related areas.

Assessment of the knowledge base is through a combination of unseen written examinations (1 to 5), unseen laboratory-based examinations (6), assessed coursework and laboratory work (1 to 6), group and individual project documentation and presentations (1,2,4,6,7 and possibly aspects of 3 and 5, depending on the project).

2. Skills and other Attributes

Intellectual Skills:

1. Analyse computing system design problems of varying types and specify those problems, and proposed solutions, in a suitable formalism. (C)

2. Reason about program correctness and algorithm complexity.

3. Construct abstract models of computer and communication systems for the purposes of functional and performance analysis.

4. Analyse unseen problems and select tools and techniques most suitable for solving them. (E), (C)

5. Design experiments for the purposes of testing and evaluation. (E), (C)

6. Perform critical evaluation of alternative designs and solution techniques for a wide range of problems. (E), (C)

7. Develop an understanding of the theory, practice and trends of more advanced computing topics. (C)

How achieved:

Skills 1 and 2 are taught and developed through the taught courses, the laboratory work, coursework exercises and group and individual project work.

Skill 3 is developed through taught courses in the first and second year and, in some cases, group and individual project work.

Skill 4 is developed through the core courses and supporting laboratory programmes in years 1 and 2.

Skill 5 is taught and developed through compulsory lectures in the second year.

Skill 6 is taught and developed through the group and individual projects.

Skill 7 is taught and developed through optional courses in the last two years.

Practical Skills:

1. Design and develop programs of varying levels of complexity using a number of different programming languages and paradigms, for example object oriented programming, logic programming, functional programming and imperative programming. (E), (C)

2. Use many computing tools and techniques, such as database, web-based and graphic tools and techniques. (E), (C)

3. Analyse computing problems and devise appropriate solutions to them. (C)

4. Give technical presentations. (E), (C)

5. Prepare technical reports. (E), (C)

6. Conduct detailed literature searches. (E),(C)

7. Plan, conduct and write up a programme of development conducted in a team. (E), (C)

8. Plan, conduct and write-up a programme of research and development conducted as an individual. (E), (C)

How achieved:

Practical skills are developed through the teaching and learning programme outlined in section 17.

Skill 1 is taught and developed through the laboratory program, the program design and programming courses, the assessed laboratory work and courseworks and the group and individual projects. They are also developed by some of the optional courses throughout the degree.

Skill 2 is taught and developed through the specialized optional courses, and through the group and individual project work.

Skill 3 is taught and developed throughout the degree through the taught courses, laboratory and coursework and group and individual project work.

Skills 4 and 5 are developed through Computing Topics, the second year summer term project, the group and individual projects.

Skill 7 is also developed as part of the group project and skills 6 and 8 as part of the individual project. The assessment of Computing Topics is by presentation and website. The assessment of the second year summer project is by presentation and demonstration. The assessment of the group project is by a technical presentation, a product demonstration and a technical report, including a detailed log. The assessment of the individual project is by a detailed dissertation and a presentation.

Other Practical skills are assessed through laboratory work, programming tests and courseworks. Skill 9 is taught in the second year Software Engineering Design course and is developed in various practical exercises and some group and individual projects.

Skill 10 is exercised in various optional courses in the third year.

Transferable Skills:

Students are able to:

1. Communicate effectively through oral presentations, computer presentations and written reports. (E), (C)

2. Program in the major computer programming paradigms. (C)

3. Use the World Wide Web effectively. (E), (C)

4. Integrate and evaluate information from multiple and diverse sources. (E), (C)

5. Work within and contribute to a team, apply management skills such as coordination, project design and evaluation and decision processes as applied in software engineering. (E), (C)

6. Manage resources and time. (E), (C)

7. Learn independently with open-mindedness and critical enquiry. (E), (C)

8. Learn effectively for the purpose of continuing professional development. (E), (C)

How achieved:

Transferable skills are developed through the teaching and learning programme outlined above and under section 11.

Skill 1 is developed through feedback on coursework, individual project, group project first and second year group work.

Skill 2 is taught through lectures and practical coursework. It is further developed, as appropriate, in the individual project.

Skills 3 and 4 are developed through the individual and group projects.

Skill 5 is developed through group project work.

Skill 6 is developed throughout the course within a series of staged deadlines.

Skills 7 and 8 are not explicitly taught but are encouraged and developed throughout the degree.

16. The following reference points were used in creating this programme specification.

The following reference point was used in creating the Programme Specification:

- Subject benchmarking information for Engineering and Computing
- Student Handbook for Course approved by Senate of Imperial College

17. Programme structure and features, curriculum units (modules), ECTS assignment and award requirements:

The programme is offered as a three-year full-time course and leads to the BEng Computing degree with honours. In the first year students sit four written papers. Three of 2 hours duration: Hardware and Architecture, Logic and Reasoning about Programs, Mathematical Methods and Discrete Mathematics. The fourth, Databases has a written paper of 1.5 hours duration. The courses that make up this assessment are compulsory and include assessed coursework that contributes separately to the overall first-year assessment. In conjunction with these assessments, a programme of continuous laboratory assessment runs throughout the year - this also contributes to the overall first-year total. The laboratory programme is assessed by a series of on-line programming tests. There are also small-group tutorials, each with weekly submissions, but which do not count toward the year total.

In the second-year students sit five core examinations and three optional examinations taken from an approved list.

Examinations

The required core examinations are:

- 1. Software Engineering
- 2. Operating Systems and Networks and Communications
- 3. Compilers and Models of Computation

4. Statistics

5. Concurrency

The first three are a merger of two subjects. Statistics is taught by the Mathematics department.

Two optional subjects must be taken from the following: Computer Architecture Computational Techniques Introduction to Artificial Intelligence

Each exam is of two hours duration.

There is an integrated programme of laboratory exercises that runs in the first two terms and a summer term project. The taught courses are assessed by a combination of examinations and coursework. Similarly to the first year, all courses have assessed coursework and a laboratory programme which runs throughout the year.

Coursework

Each lecture course has assessed course work associated with it.

In the third year students are offered a choice of computing courses from the approved course lists. Students take eight options, including compulsory professional material, each of which is examined by written paper or coursework. In addition to the required course "Management and Business for Computing Engineers" students may study one optional course offered by another department in the Engineering Faculty, the Imperial College Business School or the Humanities Department.

Final year students also have to participate in an assessed group project, assessed "Software Engineering Methods" module and also must complete and submit an individual project which contributes to the year overall total.

In order to pass both the first and second year, candidates must obtain an examination pass mark of at least 40% in each paper. They must also achieve a 40% examination aggregate, 40% in their coursework and 40% on their lab work at the end of each academic session. Additionally students in the first year must achieve a 40% aggregate mark in their programming tests which are held throughout the year. In order to pass the final year and receive honours classification, students must obtain at least 40% in their individual project. The marks from years 1, 2 and 3 contribute to the final overall degree classification in the ratio 1:2:3.

The programme is accredited by the BCS -The Chartered Institute for IT and The Institution of Engineering and Technology, providing that group and individual projects are passed at the first attempt with a minimum mark of 40%.

Year One:

In the first year students study compulsory foundational courses covering Programming, Hardware, Architecture, Discrete Mathematics, Logic, Mathematical Methods, Databases, Reasoning about Programs and Ethics in Computing. Students are introduced to the programming languages Java, Haskell, Prolog, Assembler and C via a series of lectures, assessed exercises and lab problemsolving sessions throughout the year. Students also study a course on Computing Topics which aims to introduce students to some of the state of the art ideas in Computing and provides them with the opportunity for self-directed learning in small groups. (E), (C)

Courses consist of typically eighteen lectures and nine tutorials. In the third term students sit their written examinations and complete the programming component of the first year. (E), (C)

Progression

Progression in the first year focuses on three main identifiable areas of competence. By the end of this first year of study we expect a student to be able to program any problem that can be solved within a single module (usually with approximately 100 lines of code). They have practical tests in various high level languages, which they are required to pass in aggregate. We ensure that they have developed a model of how a computer works in terms of both hardware and software. We also ensure that a student has learnt the underlying Mathematics to be able to cope with the rest of the course.

| Module | | | |
|--------------------------------|---------|--------------|---------------------|
| Name | Credits | Taught Hours | Private Study Hours |
| CO112 Hardware | 5.0 | 27 | 100 |
| CO113 Architecture | 5.0 | 27 | 100 |
| CO140 Logic | 5.5 | 37 | 110 |
| CO141 Reasoning about Programs | 5.5 | 37 | 110 |
| CO142 Discrete Mathematics | 5.5 | 27 | 125 |
| CO145 Mathematical Methods | 5.5 | 37 | 120 |
| CO130 Databases | 5.0 | 27 | 100 |
| CO120.1 Programming I | 8.0 | 115 | 120 |
| CO120.2 Programming II | 8.0 | 120 | 120 |
| CO120.3 Programming III | 4.0 | 48 | 60 |
| CO163 Computing Topics | 3.0 | 18 | 60 |
| CO164 Ethics in Computing 1 | 0.0 | 2 | 0 |
| | 60.0 | 522 | 1125 |

ECTS Credits

Year Two:

During the first term of the second year students study compulsory courses covering Compilers, Concurrency, Models of Computation, Software Engineering Design and Statistics.

Students attend a supporting laboratory programme, which runs throughout the year, including a short course in "C++". Students also study a course in Human-Centred Design in the summer term (C)

In the second term students study compulsory courses in Operating Systems, Software Engineering Algorithms and Networks and Communications, The students also choose three optional courses from an approved list. The approved options are Computer Architecture, Computational Techniques and Introduction to Artificial Intelligence.

As in Year One, Courses consist of typically eighteen lectures and nine tutorials. Foreign Languages extend over two terms and so have additional lectures and tutorials.

In the third term second year students sit their written examinations and complete an assessed laboratory exercise as part of a group. (E), (C)

Progression

The second year has three objectives, each of which expands skills and knowledge established in the first year. By the end of the second year students should be able to solve medium sized problems (using several modules), be knowledgeable about the major areas of computing and have been introduced to the major specialisms offered.

ECTS Credits

| Module | | | |
|--|---------|--------|---------------|
| | | Taught | Private Study |
| Name | Credits | Hours | Hours |
| CO220 Software Engineering Design | 4.0 | 27 | 75 |
| CO202 Software Engineering - Algorithms | 4.0 | 27 | 75 |
| CO211 Operating Systems | 4.0 | 27 | 75 |
| CO212 Networks & Communications | 4.0 | 27 | 75 |
| CO221 Compilers | 4.0 | 27 | 75 |
| CO223 Concurrency | 4.0 | 27 | 75 |
| CO240 Models of Computation | 4.0 | 27 | 75 |
| CO245 Statistics | 4.0 | 27 | 75 |
| CO203 Human-Centred Design | 2.0 | 15 | 35 |
| CO261 Laboratory Work | 12.0 | 160 | 160 |
| CO272 Team Skills Development | 0.0 | 13 | 0 |
| CO276 Introduction to Prolog | 0.0 | 19 | 0 |
| CO275 C++ Introduction | 0.0 | 12 | 0 |
| CO271 Second Year Group Projects | 6.0 | 20 | 130 |
| *CO231 Introduction to Artificial Intelligence | 4.0 | 27 | 75 |
| *CO233 Computational Techniques | 4.0 | 27 | 75 |
| *CO210 Computer Architecture | 4.0 | 27 | 75 |
| | 60.0 | 509.0 | 1075.0 |

Year Three :

During the first term of the final year, students study the compulsory course Software Engineering -Practice, and can choose from an approved list of options. Students are also permitted to study a Design-led Innovation and New Venture Creation course run by Design London or a humanities, business or engineering option.

In the second term students study the compulsory course – Management and Business for Computing Engineers. Students also attend a supporting laboratory programme which runs throughout the year. Students undertake a supervised group project in the first term which will be completed and assessed at the beginning of term 2, and an individual project which spans all three terms. The individual project is assessed at the end of term three.

As in Year Two, Courses consist of typically eighteen lectures and nine tutorials. Humanities (including foreign languages) and technical presentation skills run over terms 1 and 2 and so have additional sessions.

Students sit examinations at the end of the end of the Autumn and Spring terms and will focus on the completion and submission of their individual project in the Summer term, which is assessed by a written report and practical demonstration.

Progression

The third year has three objectives. Firstly, students should be able to solve large programming problems, including problems that need to be solved by more than one person. All students participate in both a group project and an individual project. Secondly, they should have an

understanding of professional issues, including ethics. Thirdly, they should develop a breadth of knowledge through their choice of options.

ECTS Credits

| Module | | | |
|--|---------|--------------|---------------------|
| Name | Credits | Taught Hours | Private Study Hours |
| CO302 Software Engineering with CO362 Group Project | 12.0 | 9 | 292 |
| CO350 Management and Business for Computing Engineers | 4.0 | 18 | 83 |
| CO301 Individual Project | 20.0 | 50 | 470 |
| *CO312 Advanced Databases | 4.0 | 27 | 80 |
| *CO333 Robotics | 4.0 | 27 | 80 |
| *CO317 Graphics | 4.0 | 27 | 80 |
| *CO338 Pervasive Computing | 4.0 | 27 | 80 |
| *CO316 Computer Vision | 4.0 | 27 | 80 |
| *CO341 Introduction to Bioinformatics | 4.0 | 27 | 80 |
| *CO343 Operations Research | 4.0 | 27 | 80 |
| *CO347 Distributed Algorithms | 4.0 | 27 | 80 |
| *CO330 Network Security | 4.0 | 27 | 80 |
| *CO395 Machine Learning | 4.0 | 27 | 80 |
| *CO337 Simulation and Modelling | 4.0 | 27 | 80 |
| *CO332 Advanced Computer Architecture | 4.0 | 27 | 80 |
| *CO318 Custom Computing | 4.0 | 27 | 80 |
| *CO303 Systems Verification | 4.0 | 27 | 80 |
| *CO304 Logic-Based Learning | 4.0 | 27 | 80 |
| *CO331 Network and Web Security | 4.0 | 27 | 80 |
| *CO320 Complex Systems | 4.0 | 27 | 80 |
| *CO382 Type Systems for Programming Languages | 4.0 | 27 | 80 |
| *CO322 Communicating Computer Science in Schools | 4.0 | 27 | 80 |
| *BS0808 Finance & Financial Management | 6.0 | 30 | 120 |
| *BS0815 Business Economics | 6.0 | 20 | 130 |
| *BS0845 Strategy | 6.0 | 30 | 120 |
| *BS0847 Managing Organisations | 6.0 | 30 | 120 |
| *HSCS3003 Philosophy of Mind | 6.0 | 30 | 120 |
| *HSCS3007 Technology, Justice & Security | 6.0 | 42 | 108 |
| *ML.34 Japanese Level 4 | 6.0 | 42 | 108 |
| *ML.72 Mandarin for Cantonese Speakers - Level 2 | 6.0 | 42 | 108 |
| *ML12 German level 2 | 6.0 | 42 | 108 |
| *ML15 German Level 5 | 6.0 | 42 | 108 |
| * ML33 Japanese Level 3 | 0.0 | 42 | 108 |
| *ML42 Spanish Level 2 | 6.0 | 42 | 108 |
| *ML53 Russian Level 3 | 6.0 | 42 | 108 |
| | 60.0 | 239.0 | 1325.0 |

* Students choose six optional courses. # Students can take a Humanities or Business course instead of a Computing Option for Credit

18. Support provided to students to assist learning (including collaborative students, where appropriate).

Students are given a one-week orientation at the beginning of the Autumn Term in the first year, including an introduction to the Department, the library, personal tutors and the degree programme.

In their first year students are allocated a personal tutor, a personal maths tutor, a mathematical methods tutor and a personal programming tutor. The personal tutors' role is to assist their tutees with personal problems and to advise students on academic issues that may arise during the course of their degree. The dual role of the programming and maths tutors is to provide continuous monitoring and feedback of the students' academic progress and to provide technical support tailored to the individual.

All students have an email account and open personal access to their tutorial support details. The same information is available to the year coordinators, Senior Tutor and Director of Studies.

Students have access to student counsellors on-site.

Elected student Undergraduate Student Representatives (two for each of the three years) and the Departmental Student Representative meet with academics at the staff-student Committee five times per year to discuss issues relating to their study. The Representatives also meet with year coordinators as and when problems arise. In addition to this the Departmental student Representative sits in on the Academic Committee, which meets once per month.

All first year students have a "buddy" allocated to them. The buddy is a Computing student in their Second, third or fourth year who is available for advice on issues associated with settling in at university.

All students have access to Teaching and Learning Support Services, which provide assistance and guidance e.g. on careers.

State-of-the-art Computing facilities, with about 200 desktop computers. The stock is regularly upgraded and the scheduled lab sessions have lab staff to assist with technical queries.

An undergraduate handbook provides students with descriptions of every course available on their programme of study.

All students have access to the Internet and the BEng web page gives details of courses available, their syllabuses and guides to completing project work. Students also have access to the Departmental web pages which include examination and lecture timetables, the in-house "Continuous Assessment Tracking Engine, (CATE)" used for the electronic administration of coursework via the web and an online computing dictionary as well as links to careers and the main college web site.

Employer needs and opinions feed into the programme through our industrial placement scheme , from frequent guest lectures and seminars from industry, industry inspired group and individual projects and collaboration between staff and industry in research and consultancy.

The Department's student society (DocSoc) regularly invite guest speakers from industry to discuss career and technical issues.

An Industrial panel consisting of influential members of Industry and professional institutions has been formed partly with the purpose of feeding needs and opinions into our teaching programmes.

19. Criteria for admission:

Typical entry requirements are A* in mathematics plus an A grade in two further A levels.

20. Processes used to select students:

Candidates who achieve the typical entry requirements are offered an interview based on the strength of their UCAS applications.

Candidates passing their interview will usually be made an offer within 3 weeks of the interview day.

The interview day consists of:

- a welcome presentation by the Admissions tutor and Director of Studies
- a tour of the College and Department facilities
- · demonstrations of undergraduate projects
- a one-to-one academic interview with one of our lecturers

21. Methods for evaluating and improving the quality and standards of teaching and learning.

a) Methods for review and evaluation of teaching, learning, assessment, the curriculum and outcome standards:

The external examiners and Boards of Examiners for the UG programmes in Computing are central to the process by which the College monitors the reliability and validity of its assessment procedures and academic standards. Boards of Examiners comment on the assessment procedures within the College and may suggest improvements for action by the Department's Academic Committee.

The Faculty Studies Committees review and considers the reports of external examiners and accrediting bodies and conducts periodic (normally quinquennial) and internal reviews of teaching provision. Regular reviews ensure that there is opportunity to highlight examples of good practice and ensure that recommendations for improvement can be made.

At programme level, the Head of Department/Division has overall responsibility for academic standards and the quality of the educational experience delivered within the department or division.

The BEng Computing programme is accredited by BCS-The Chartered Institute for IT" and "The Institution of Engineering and Technology". Accreditation provides the College with additional assurance that its programme is of an appropriate standard and relevant to the requirement of industry and the professions.

b) Committees with responsibility for monitoring and evaluating quality and standards:

The **Senate** oversees the quality assurance and regulation of degrees offered by the College. It is charged with promoting the academic work of the College, both in teaching and research, and with regulating and supervising the education and discipline of the students of the College. It has responsibility for approval of changes to the Academic Regulations, major changes to degree programmes and approval of new programmes.

The Faculty Studies Committees and Graduate School Postgraduate Quality Committees are the major vehicle for the quality assurance of undergraduate / postgraduate courses respectively. Their remit includes: setting the standards and framework, and overseeing the processes of quality assurance, for the areas within their remit; monitoring the provision and quality of e-learning; undertaking reviews of new and existing courses; noting minor changes in existing programme curricula approved by Departments; approving new modules, changes in module titles, major changes in examination structure and programme specifications for existing programmes; and reviewing proposals for new programmes, and the discontinuation of existing programmes, and making recommendations to Senate as appropriate.

The **Faculty Teaching Committees** maintain and develop teaching strategies and promote interdepartmental and inter-faculty teaching activities to enhance the efficiency of teaching within Faculties. They also identify and disseminate examples of good practice in teaching. The **Academic Committee** meets monthly and deals with both the strategic and the regular day to day decisions about the Departments teaching. Subcommittees are formed and look at problem areas. Year and Course Coordinators discuss problems of their constituencies. Topics for discussion can come from any member of the teaching staff and sometimes come from the Departments Operations Committee. Decisions requiring regulations to be changed go to the Engineering Studies Committee and then to College Senate.

c) Mechanisms for providing prompt feedback to students on their performance in course work and examinations and processes for monitoring that these named processes are effective:

Undergraduate teaching assistants (UTAs) are paid to mark weekly submissions from first year students in Programming and Logic and Discrete Maths; they also lead the tutorial discussions in collaboration with the academic tutor at weekly meetings. Students who fail to submit an exercise are encouraged to catch up and submit after the deadline by the academic tutor/UTA. Students who display a pattern of non-submission are referred to the Senior Tutor. First year submissions, marks and attendance records are available to all staff via CATE. Where necessary, students will be given additional support by either the UTA or academic tutor.

Marking and the dissemination of coursework marks are required to be completed within three weeks of being handed in unless it is a piece of first year coursework where the deadline is two weeks from the hand-in date. This is monitored and tracked by CATE. Each lecturer nominates one person (the lecturer themselves or a registered helper) to take responsibility for the collection of submitted coursework, the distribution of coursework for marking and the return of marked coursework. The lecturer ensures that the marked work provides the necessary level of feedback. The nature of the feedback that can be expected is made clear to students prior to the exercise being distributed.

CATE requires students to submit their work either electronically or manually according to the needs of the course lecturer. The Senior Tutor is informed of late submissions and, once submitted, the system will then track the progress of the work being marked and publishes the marks to students when marking is complete. Failure to publish the marked work within the set time will result in CATE automatically emailing the relevant lecturers of the lateness.

d) Mechanisms for gaining student feedback on the quality of teaching and their learning experience and how students are provided with feedback as to actions taken as a result of their comments:

Feedback from students is achieved in the following ways:

- The Student On-Line Evaluation Questionnaire (SOLE).
- The Staff-Student Committee meeting, which is held each term. Feedback from this is passed on to the Academic Committee.
- Meetings with personal tutees.
- Regular meetings between student representatives and year coordinators.

e) Mechanisms for monitoring the effectiveness of the personal tutoring system:

Attendance at small group tutorials is recorded on CATE and is visible to the student and the Senior Tutor.

Attendance at personal tutorials and a record for follow up is recorded on an in house tracking system called CHAOS (Care & Holistic Attention of Students) and is visible to the student and the Senior Tutor.

f) Mechanisms for recognising and rewarding excellence in teaching and in pastoral care:

Staff are encouraged to reflect on their teaching, in order to introduce enhancements and develop innovative teaching methods. Each year College awards are presented to academic staff for outstanding contributions to teaching, pastoral care or research supervision. Nominations for these

awards come from across the College and students are invited both to nominate staff and to sit on the deciding panels.

g) Staff development priorities for this programme include:

- Active research programme in multiple fields of Computing.
- Staff appraisal schemes and staff development programmes.
- Updating professional developments.

22. Regulation of Assessment.

a) Assessment Rules and Degree Classification:

The BEng Computing degree is classified according to the following range of marks:

| First class | 70 - 100% |
|-------------------------------|------------|
| Second class (upper division) | 60 - 69.9% |
| Second class (lower division) | 50 - 59.9% |
| Third class | 40 - 49.9% |

b) Marking Schemes for undergraduate and postgraduate taught programmes:

The Pass Mark for all **undergraduate** modules is 40%. From October 2008 entry all undergraduates are required to pass all their course units to progress to the next year.

c) Processes for dealing with mitigating circumstances:

Candidates with mitigating circumstances are not subject to the borderline restrictions but are considered individually. However, as a general principle, candidates whose marks are more than 5% below the borderline are not normally raised to the next higher classification. Where the Board of Examiners determines that a higher classification should be awarded extra marks should be applied to bring the final marks into the higher range.

Details of mitigating circumstances such as medical certificates are lodged with the Senior Tutor. Where there is a case to be made the Senior Tutor makes the information available to the relevant exam sub-board, which may then recommend the case to be considered by the main board.

d) Processes for determining degree classification for borderline candidates:

Candidates who fall no more than 2.5% below the minimum mark for a higher honours classification shall be eligible for review of their final classification by the examination board. Candidates whose marks are below the 2.5% borderline may be considered for a higher honours classification where certain provisions apply. Where the Board of Examiners determines that a candidate should be awarded a higher honours classification extra marks are applied to bring their final marks into the higher range. Detailed records of all decisions are recorded in the minutes of the meeting of the Board.

e) Role of external examiners:

The primary duty of external examiners is to ensure that the degrees awarded by the College are consistent with that of the national university system. External examiners are also responsible for approval of draft question papers, assessment of examination scripts, projects and coursework (where appropriate) and in some cases will attend *viva voce* and clinical examinations. Although external examiners do not have power of veto their views carry considerable weight and will be treated accordingly. External examiners are required to attend each meeting of the Board of

Examiners where recommendations on the results of individual examinations are considered. External examiners are required to write an annual report to the Rector of Imperial College which may include observations on teaching, course structure and course content as well as the examination process as a whole. The College provides feedback to external examiners in response to recommendations made within their reports.

23. Indicators of Quality and Standards:

- Favourable comments by External Examiners.
- Favourable comments from the students.
- Recognition amongst employers.
- Recognition and high profile of the course amongst applicants (as judged by the quality of applications).
- Professional accreditation

24. Key sources of information about the programme can be found in:

http://www3.imperial.ac.uk/computing/teaching/ug

http://www3.imperial.ac.uk/computing/teaching/ug/bengcomp

http://www3.imperial.ac.uk/computing/admissions/ug/comp

http://www3.imperial.ac.uk/computing/teaching/ug/bengcomp/beng-regulations

http://www.doc.ic.ac.uk/teaching/brochure/brochure.pdf

http://www3.imperial.ac.uk/ugprospectus/facultiesanddepartments/computing/computingcourses