	PROGRAMME SPECIFICATION	Newcastle University

1	**Awarding Institution**	Newcastle University
2	**Teaching Institution**	Newcastle University
3	**Final Award**	MComp (Hons)
4	**Programme Title**	Computer Science Computer Science with Study Abroad Computer Science (Networked Systems and Internet Technologies) Computer Science with Study Abroad (Networked Systems and Internet Technologies) Computer Science (Games and Virtual Environments) Computer Science with Study Abroad (Games and Virtual Environments) Computing Science (Bio-Computing) Computing Science with Study Abroad (Bio-Computing)
5	**UCAS/Programme Code**	G405 G406 I120 I121 I610 I611 I522 I523 I192 I193
6	**Programme Accreditation**	British Computer Society
7	**QAA Subject Benchmark(s)**	Computing
8	**FHEQ Level**	7
9	**Last updated**	26 March 2011

10	**Programme Aims**

1. To produce graduates with the in-depth knowledge and skills necessary to exploit computing systems throughout their professional life. Graduates will have a clear understanding of the practical, theoretical and professional foundations of Computing Science. They will have knowledge and experience of the fundamental techniques used in modern software engineering. They will also have an understanding of the architectural concepts underpinning computer and networking hardware platforms. They will be able to apply relevant theory to the solution of practical problems and to the analysis of existing algorithms and techniques, and to recommend techniques and algorithms appropriate to specific circumstances in the areas of fundamental systems and major applications. They will also be able to appreciate, develop and evaluate new algorithms, techniques and other developments within the computing field.

2. To provide a flexible structure that allows students to follow a general programme in Computing Science for two years then specialise in their 3rd and 4th years. Students

studying for the G405 and G406 programmes will be able to design, build and integrate advanced networked computing systems in a range of application areas, such as mobile and wireless communications, computationally intensive financial and health applications, and business-critical enterprise applications involving multiple businesses and outsourcing. We envisage students growing into architect and chief architect roles for software product groups in start-ups or other enterprises, and being able to initiate and lead consulting efforts for field implementations of networked computing solutions. Students studying for the G4XA, G4XB, G4XC, G4XD, G4XE, G4XF programmes specialise in their last two (3rd and 4th) years in one of three areas:

    a. Students may choose to specialise in Networked Systems and Internet Technologies. These students will be able to design, build and integrate advanced networked computing systems in a range of application areas, such as mobile and wireless communications, computationally intensive financial and health applications, and business-critical enterprise applications involving multiple businesses and outsourcing. We envisage students growing into architect and chief architect roles for software product groups in start-ups or other enterprises, and being able to initiate and lead consulting efforts for field implementations of networked computing solutions.

    b. Students may choose to specialise in Games and Virtual Environments. These students will be able to design, develop and implement computer graphics software and applications on a variety of architectures including games consoles, graphics workstations and advanced 3D virtual reality environments, and to exploit such software and hardware in entertainment, engineering design and scientific visualisation. We envisage graduates pursuing these activities in both the entertainment and the industrial sectors; some may also seek to develop market-niche software in small or start-up companies.

    c. Students may choose to specialise in Bio-Computing. These students will have particular knowledge and skills related to the development of computing applications relevant to biological sciences, for example applications in bioinformatics, neuroinformatics, computational systems biology, or biological modelling. They will be equipped to develop as professionals to assume lead technical and team management roles in such developments. We envisage graduates going on to employment in technical positions in software houses and with companies focusing on the development of software systems for medical and biological applications; some may also seek to develop market-niche software in small or start-up companies.

3. To provide programmes that equip students with subject-specific and transferable skills that will enable them to pursue a variety of careers within, and outside, the IT industry, including research.

4. To provide programmes which meet the accreditation requirements of appropriate professional bodies, thus providing the basis for further professional development and lifelong learning.

5. To provide programmes which meet the FHEQ at Masters Levels and which takes appropriate account of the subject benchmark statements in Computing.

6. For those students taking a programme with study abroad, to provide students with the opportunity to develop their skills within an international setting.

11 Learning Outcomes
The programmes provide opportunities for students to develop and demonstrate knowledge and understanding, qualities, skills and other attributes in areas of computing science. The programme outcomes cover the benchmark statements for Computing.

The strategy of the degree programmes is to give a broad coverage of the subject of Computing Science in Stages 1 and 2, and then to offer specialisation at Stage 3 and Stage 4 in the form of a wide range of optional modules.

The following identifies the generic Intended Learning Outcomes for the programmes. There will be variation depending on the nature of the study abroad (if that is part of the programme), and the options taken at Stage 3 and Stage 4.

Knowledge and Understanding

On completing any of the programmes students should have gained and be able to demonstrate knowledge and understanding of:

A1. A diverse range of programming paradigms and languages supported by programming language principles
A2. The principles of software engineering
A3. The theoretical and mathematical foundations of Computing Science
A4. Techniques for the development of data representations and algorithms
A5. Computer and network organisation and hardware architectures
A6. Professional issues, including legal and ethical aspects of professional practice, professional development, social roles and effects of computing systems
A7. Research techniques

Additionally, a student will have gained and be able to demonstrate knowledge and understanding of a range of topics depending on their compulsory or optional modules.

A student taking modules from the Networked Systems and Internet Technologies specialism will additionally have gained and be able to demonstrate knowledge and understanding of:

A8. Advanced technological foundations of networked systems, in depth and breadth
A9. Middleware and integration standards, platforms and advanced issues
A10. Fundamental networked and internet protocols and algorithms
A11. Techniques for networked and Internet programming, including advanced topics
A12. Solutions for secure, reliable and trusted networked and internet computing, including trust and dependability enhancements

A student taking modules from the Games and Virtual Environments specialism will additionally have gained and be able to demonstrate knowledge and understanding of:

A13. Technological foundations of computer games including computer graphics and virtual reality platforms
A14. The mathematical principles and algorithmic basis of computer graphics and virtual physics
A15. Design issues and advanced development techniques for computer graphics, games and virtual environments
A16. Human requirements and technical capabilities of modern games, graphics platforms, and virtual environments
A17. Fundamental and advanced problems and approaches in artificial intelligence, as applied to computer games, visualisation and virtual environments

A student taking modules from the Bio-Computing specialism will additionally have gained and be able to demonstrate knowledge and understanding of:

A18. Advanced knowledge of bioinformatics software tools and programming environments
A19. Theoretical foundations of bioinformatics
A20. Biological principles and systems that are required for bio-computing
A21. Basic principles of analysis and modelling of complex biological systems
A22. Mathematical and statistical foundations and software development techniques for bioinformatics and neuroinformatics

Teaching and Learning Methods

Lectures are the main way of imparting knowledge and understanding (A1-A22), but tutorials are also used. Practical classes feature prominently, especially to support the Stage 1

programming modules (A1, A2). Visiting speakers provide seminars on aspects of being an IT professional (A6). Students are expected to contribute to their own learning experience by independent reading. They are provided with references to books which are categorised as *essential*, *recommended*, and *background* reading, as well as scientific papers and other learning materials including appropriate web URLs. In addition, when taken, the study abroad will involve the development of knowledge within an international setting.

Assessment Strategy

Knowledge and understanding are assessed by means of closed and open book written examinations, and coursework, including team and individual project reports and log books (A1-A22).

Intellectual Skills

On completing any of the programmes students should have skills in the areas of:

B1. Carrying out the process of software development, including: the analysis of system requirements; the production of system specifications using appropriate models and techniques; software validation and verification
B2. The knowledge of a variety of advanced (especially object-oriented) programming languages and paradigms
B3. The knowledge of a variety of computer-based (including operating) systems
B4. The application of theoretical concepts of computing science in the design and analysis of systems and algorithms
B5. The identification and implementation of appropriate algorithms and data structures
B6. The knowledge and provision of network information services

A student will have additional skills depending on their compulsory or optional modules.

A student taking modules from the Networked Systems and Internet Technologies specialism will additionally have skills in the areas of:

B7. Designing and building realistic networked systems and Internet applications
B8. Identification and trade-off analysis of issues such as security, trust and reliability in networked systems and internet applications
B9. Integration of a wide variety of protocols and platforms, including trust and dependability computing
B10. Ability to grasp and articulate the key contributions of emerging and future networked and internet computing technologies

A student taking modules from the Games and Virtual Environments specialism will additionally have skills in the areas of:

B11. Development and/or implementation of graphics and physics algorithms and applications in standard and distributed software environments
B12. Modelling, rendering and interaction in 3D graphical environments
B13 Mathematical techniques for the manipulation of virtual physics environments
B14. Implementation of artificial intelligence algorithms in a declarative language and C++

A student taking modules from the Bio-Computing specialism will additionally have skills in the areas of:

B15. Development and implementation of algorithms and simulation implementations in scientific computing environments (e.g. R, Matlab)
B16. Bioinformatics software development environments (e.g. BioJava, Python)
B17. Informed choices among bioinformatics software tools and techniques
B18. Implementation and analysis of computational / mathematical / statistical models of biological systems

Teaching and Learning Methods

B1-B6 feature prominently in all modules. In particular a team project at Stage 2 and Stage 4

gives students experience of working with others (see D7 below) to engineer a complex piece of software (B2, B4, B5). Individual projects at Stage 3 and Stage 4 will require students to develop large pieces of software to a customer's requirements (B1, B2, B4, B5). In all other modules, coursework is used to develop these skills (B1-B18).

Assessment Strategy

Subject-specific and professional skills are assessed by coursework (B1-B18).

Practical Skills

On completing any of the programmes students should have:
C1.   The ability to conduct investigations using the technical and professional literature
C2.   The ability to use and evaluate appropriate tools and techniques
C3.   The ability to undertake empirical evaluation of alternative solutions
C4.   The ability to solve problems by identifying suitable approaches using computer-based systems
C5.   The ability to reason abstractly about the structure and behaviour of computer systems

Teaching and Learning Methods

All modules involve coursework, much of which involves problem solving skills (C4). This is especially so in the team and individual projects, where students need to select, evaluate and apply appropriate tools and techniques (C2). Here and elsewhere students will need to investigate possible alternatives in the technical and professional literature (C1, C3), and to reason about computer systems (C5).

Assessment Strategy

Practical skills are assessed by a range of coursework (reports, design documents, etc.) (C1-C5).

Transferable/Key Skills

On completing any of the programmes students should be able to use the following skills:
D1.   Written communication, particularly technical writing
D2.   Problem solving
D3.   Interpersonal communication
D4.   Initiative
D5.   Oral presentation
D6.   Adaptability
D7.   Teamwork
D8.   Numeracy
D9.   Planning and organisation
D10. Computer literacy

Teaching and Learning Methods

Key skills feature throughout all programmes; teamwork in the Stage 2 and Stage 4 team projects (D7); oral presentation, interpersonal communication, and planning and organisation in the Stage 3 and Stage 4 research methods and individual project modules, as well as the Stage 2 and Stage 4 team projects (D3, D5, D9); written communication in all modules, but especially in the Stage 2 and Stage 4 team projects, and the Stage 3 and Stage 4 individual projects (D1); numeracy is covered by a Mathematics module at Stage 1 and exercises in the programming modules (D8); computer literacy, problem solving, initiative and adaptability are necessarily covered throughout all programmes (D2, D4, D6, D10).

Assessment Strategy

Key (transferable) skills are assessed by both written and oral presentations (D1-D10). Teamwork in the Stage 2 and Stage 4 team projects is assessed both by the module leader at team oral presentations and by a team monitor (a member of teaching staff) who attends team formal meetings (D5, D7).

12   Programme Curriculum, Structure and Features

Basic structure of the programme

All programmes have 4 Stages and when a study abroad is taken (if it is part of the programme), the whole of Stage 3 shall be taken at a partner institution that offers an equivalent programme (curriculum, structure, features) for this stage. Students are required to take 120 credits at each Stage. In the case of students who take the study abroad option (G406, G4XB, G4XD, G4XF) the calculation of credits will be done according to the credit conversion rules included in the partnership agreement with the partner institution.

Students take six compulsory 20-credit modules in each of Stages 1 and 2. The teaching of these modules is split equally across semesters 1 and 2 so that students study 60 credits in each semester. At Stage 1 students who passed A-level Mathematics at grade C or above (or equivalent) take MAS1404 Mathematics for Computing Science. Those without this qualification take CSC1013 Foundation Mathematics for Computing Science. For both sets of students further mathematical concepts are covered as and where necessary in modules at each Stage. However, certain modules at Stage 3, as indicated in the Degree Programme Handbook, may not be available to those students who have taken CSC1013.

A wide range of optional modules is available to G405, G4XA, G4XC and G4XE students at Stage 3. However, all must take the 40-credit individual project module CSC3095 and in the case of G4XA, G4XC and G4XE students, 40 credits of specialist modules. An equivalent project module will be compulsory for study abroad students.

Students study a group of compulsory modules and a range of optional modules covering advanced computer science topics at Stage 4. However, all students must take the 5 credit research skills module CSC8205 and the 30-credit individual project module CSC8498.

Relevant sections of the School's Placements Handbook which conforms to the University's Policies and Procedures for Assuring the Standards of Work-Based and Placement Learning will apply in the case of students taking a programme with study abroad.

Key features of the programme (including what makes the programme distinctive)

Students on G406, G4XB, G4XD, G4XF will study Stage 3 abroad at one of our ERASMUS or other overseas partner institutions.

To gain BCS accreditation students are required to have studied Stage 2 and at least one of Stage 3 and Stage 4 at the Newcastle campus. Students must have also passed a problem-solving project at the first attempt.

Programme regulations (link to on-line version)

http://www.ncl.ac.uk/regulations/programme/2011-2012/comp.php

13   Criteria for admission

Entry qualifications

Minimum Grade B GCSE Mathematics

A-Level Subjects and Grades
Typical ABB/AAC at A2. We do not require any particular A-Level subjects to have been taken.
Those without A-Level Mathematics grade C or above will take CSC1013 in Stage 1.

We accept applications for APL.

Alternative entry qualifications
We accept a wide range of alternative qualifications, such as IB 30 points, BTEC National Diploma 2 Distinctions and 1 Merit, Scottish Highers BBBBB, appropriate Access, Bridging and Foundation programmes, and the INTO programmes that prepare overseas students for study in the UK.

Admissions policy/selection tools
Applicants are invited to visit the School for interview and to see the University and to meet staff and current undergraduates on the programmes. Attendance is strongly encouraged but not compulsory and applicants who are not based in the UK are not expected to attend.

Additional Requirements
None.

Level of English Language capability
For applicants whose first language is not English we ask for IELTS 6.5 or TOEFL 90 (Internet-based).

14   Support for Student Learning

The Student Services portal provides links to key services and other information and is available at: *http://www.ncl.ac.uk/students/*

Induction
During the first week of the first semester students attend an induction programme. New students will be given a general introduction to University life and the University's principle support services and general information about the School and their programme, as described in the Degree Programme Handbook. New and continuing students will be given detailed programme information and the timetable of lectures/practicals/labs/ tutorials/etc. The International Office offers an additional induction programme for overseas students.

Study skills support
Students will learn a range of Personal Transferable Skills, including Study Skills, as outlined in the Programme Specification. Some of this material, e.g. time management is covered in the appropriate Induction Programme. Students are explicitly tutored on their approach to both group and individual projects.

Numeracy support is available through Maths Aid and help with academic writing is available from the Writing Centre (further information is available from the Robinson Library).

Academic support
The initial point of contact for a student is with a lecturer or module leader, or their tutor (see below) for more generic issues. Thereafter the Degree Programme Director or Head of School may be consulted. Issues relating to the programmes may be raised at the Staff-Student Committee, and/or at the Board of Studies.

Pastoral support
All students are assigned a personal tutor whose responsibility is to monitor the academic performance and overall well-being of their tutees. In addition the University offers a range of support services, including one-to-one counselling and guidance or group sessions / workshops on a range of topics, such as emotional issues e.g. Stress and anxiety, student finance and budgeting, disability matters etc. There is specialist support available for students with dyslexia and mental health issues. Furthermore, the Union Society operates a Student Advice Centre, which can provide advocacy and support to students on a range of topics including housing, debt, legal issues etc.

Support for students with disabilities
The University's Disability Support Service provides help and advice for disabled students at the University - and those thinking of coming to Newcastle. It provides individuals with: advice about the University's facilities, services and the accessibility of campus; details about the technical support available; guidance in study skills and advice on financial support arrangements; a resources room with equipment and software to assist students in their studies.

Learning resources
The University's main learning resources are provided by the Robinson and Walton Libraries

(for books, journals, online resources), and Information Systems and Services, which supports campus-wide computing facilities.

All new students whose first language is not English are required to take an English Language Proficiency Test. This is administered by INTO Newcastle University Centre on behalf of Newcastle University. Where appropriate, in-sessional language training can be provided. The INTO Newcastle University Centre houses a range of resources which may be particularly appropriate for those interested in an Erasmus exchange.

15	**Methods for evaluating and improving the quality and standards of teaching and learning**

Module reviews
All modules are subject to review by questionnaires which are considered by the Board of Studies. Changes to, or the introduction of new, modules are considered at the Board of Studies and/or the School Teaching and Learning Committee. Student opinion is sought at the Staff-Student Committee and/or the Board of Studies. New modules and major changes to existing modules are subject to approval by the Faculty Teaching and Learning Committee.

Programme reviews
The Board of Studies conducts an Annual Monitoring and Review of the degree programmes and reports to Faculty Teaching and Learning Committee. The FTLC takes an overview of all programmes within the Faculty and reports any Faculty or institutional issues to the University Teaching and Learning Committee.

External Examiner reports
External Examiner reports are considered by the Board of Studies. The Board responds to these reports through Faculty Teaching and Learning Committee. External Examiner reports are shared with institutional student representatives, through the Staff-Student Committee.

Student evaluations
All modules, and the degree programmes, are subject to review by student questionnaires. Informal student evaluation is also obtained at the Staff-Student Committee, and the Board of Studies. The National Student Survey is sent out every year to final-year undergraduate students, and consists of a set of questions seeking students' views on the quality of the learning and teaching. The results from student surveys are considered as part of the Annual Monitoring and Review of the programmes and any arising actions are captured at programme and School / institutional level and reported to the appropriate body.

Mechanisms for gaining student feedback
Feedback is channelled via the Staff-Student Committee and the Board of Studies.

Faculty and University Review Mechanisms
The programmes are subject to the University's Internal Subject Review process. Every five years degree programmes in each subject area are subject to periodic review. This involves both the detailed consideration of a range of documentation, and a two-day review visit by a review team which includes an external subject specialist in addition to University and Faculty representatives. Following the review a report is produced, which forms the basis for a decision by University Teaching and Learning Committee on whether the programmes reviewed should be re-approved for a further five year period.

Accreditation reports
The Stage 1, Stage 2 and Stage 3 parts of the programmes covered by this Degree Programme Specification were accredited by the British Computer Society in October 2008.

Additional mechanisms
None.

16	Regulation of assessment

Pass mark
The pass mark for Level 7 modules is 50, and for Level 4, 5 and 6 modules is 40.

Course requirements
Progression is subject to the University's Undergraduate Progress Regulations and Integrated Masters Examination Conventions. In order to progress a student must meet the internal progression thresholds at the end of Stages 2 and 3, which are 60% at the end of Stage 2, and 60% at the end of Stage 3. Students not meeting the threshold at the end of Stage 2 will be transferred on to the appropriate Bachelor's Degree programme. Students not meeting the threshold at the end of Stage 3 will not be permitted to progress to Stage 4 and will be considered for the appropriate Stage 3 exit award. Compensation rules do apply to this programme at Stages 1, 2 and 3 along with reassessment opportunities and these are fully outlined in the Examination Conventions.

Weighting of Stages
Marks from all modules studied at Stages 2, 3 and 4, may contribute to degree classification as specified in the relevant degree programme regulations.

Common Marking Scheme
The University employs a common marking scheme, which is specified in Integrated Masters Examination Conventions, namely:

Summary description applicable to Honours level Degree Classification Modules (levels 4-6)		Summary description applicable to level 7 Degree Classification Modules	
<39	Fail	<39	Fail
40-49	Third Class	40-49	Fail
50-59	Second Class, Second Division	50-59	Second Class, Second Division
60-69	Second Class, First Division	60-69	Second Class, First Division
70 or above	First Class	70 or above	First Class

Role of the External Examiner
An External Examiner, a distinguished member of the subject community, is appointed by Faculty Teaching and Learning Committee, following recommendation from the Board of Studies. The External Examiner is expected to:
   i.   See and approve assessment papers
   ii. Moderate examination and coursework marking
   iii. Attend the Board of Examiners
   iv. Report to the University on the standards of the programme

In addition, information relating to the programmes is provided in:

The University Prospectus: http://www.ncl.ac.uk/undergraduate/

The School Brochure: http://www.ncl.ac.uk/computing/

Degree Programme and University Regulations: http://www.ncl.ac.uk/regulations/docs/

The Degree Programme Handbook
(see http://www.cs.ncl.ac.uk/teaching/undergraduate/index.php)

Please note. This specification provides a concise summary of the main features of the

programmes and of the learning outcomes that a typical student might reasonably be expected to achieve if she/he takes full advantage of the learning opportunities provided. The accuracy of the information contained is reviewed by the University and may be checked by the Quality Assurance Agency for Higher Education.

Mapping of Intended Learning Outcomes onto Curriculum/Modules

Notes:
1. MAS1404 and CSC1013 are alternative compulsory modules.
2. Modules qualified by (NSIT), (GVE) and (BC) are compulsory for students studying for the degrees G4XA – Networked Systems and Internet Technologies, G4XC – Games and Virtual Environments, and G4XE – Bio-Computing respectively.
3. CSC8XXX modules qualified by (NSIT), (GVE) and (BC) are compulsory for students studying for the degrees G4XB – Networked Systems and Internet Technologies with Study Abroad, G4XD – Games and Virtual Environments with Study Abroad, and G4XF – Bio-Computing with Study Abroad respectively.

Intended Learning Outcome	Module codes (Compulsory in Bold)
A1	**CSC1011, CSC1012, CSC1014, CSC1016, CSC2011, CSC2012, CSC2013, CSC2014, CSC2015,** CSC3004, CSC3005, **CSC3095**, CSC3101 (NSIT), CSC3103 (NSIT), CSC3202 (GVE), CSC3504, CSC8103 (CS, NSIT), CSC8201 (CS, NSIT), CSC8104, CSC8106, CSC8204, CSC8501 (GVE), CSC8502 (GVE), CSC8503 (GVE), CSC8108, CSC8312 (BC), CSC8306 (BC), CSC8311
A2	**CSC1011, CSC1012, CSC1014, CSC2011, CSC2012, CSC2013, CSC2014, CSC2015, CSC2016,** CSC3001, CSC3002 (NSIT), CSC3003, CSC3005 , **CSC3095,** CSC3201 (GVE), CSC3202 (GVE), CSC3301 , CSC3304, CSC3303, CSC8105, CSC8202, CSC8101, CSC8102, CSC8106, CSC8203, CSC8501 (GVE), CSC8312 (BC), CSC8311
A3	**CSC1013/MAS1404, CSC1016, CSC2012, CSC2014, CSC2015, CSC2016,** CSC3004, CSC3101 (NSIT), CSC3201 (GVE), CSC3503, **MAS1404**, CSC8305 (BC), CSC8503 (GVE), CSC8105, MAS8401 (BC)
A4	**CSC1011, CSC1012, CSC2011, CSC2012, CSC2015, CSC2016,** CSC3002 (NSIT), CSC3005 , CSC3006 (BC), CSC3101 (NSIT), CSC3201 (GVE), CSC3503, CSC3XXX (BC), CSC3YYY (BC), CSC8103 (CS, NSIT), CSC8101, CSC8105, CSC8502 (GVE), CSC8503 (GVE), CSC8307, CSC8305 (BC), CSC8312 (BC)
A5	**CSC1016, CSC2013,** CSC3001, CSC3002 (NSIT), CSC3003, CSC3005, CSC8306 (BC), CSC8104, CSC8102
A6	**CSC1015, CSC2015,** CSC3002 (NSIT), CSC3003, CSC3006 (BC), CSC3101 (NSIT), CSC3202 (GVE), CSC3303, CSC8201 (CS, NSIT), CSC8202, CSC8203, CSC8312 (BC), CSC8206 (CS, NSIT, BC), CSC8506 (GVE)
A7	**CSC3095, CSC8498**
A8	CSC3101 (NSIT), CSC8104, CSC8204, CSC8201 (CS, NSIT)
A9	CSC3104 (BC), CSC8201 (CS, NSIT), CSC8106, CSC8108
A10	CSC3101 (NSIT), CSC3104 (BC), CSC8103 (CS, NSIT), CSC8105, CSC8202
A11	CSC3103 (NSIT), CSC3104 (BC), CSC8108, CSC8203, CSC8106, CSC8204, CSC8102, CSC8101, CSC8104
A12	CSC3101 (NSIT), CSC3102 (NSIT), CSC3104 (BC), CSC8201 (CS, NSIT), CSC8105, CSC8202, CSC8102, CSC8204
A13	CSC3201 (GVE), CSC3202 (GVE), CSC3204 (GVE), CSC3503, CSC8502 (GVE)

A14	CSC3201 (GVE), CSC3202 (GVE), CSC3204 (GVE), CSC3503, CSC8502 (GVE), CSC8503 (GVE)
A15	CSC3202 (GVE), CSC3203 (GVE), CSC3204 (GVE), CSC3503, CSC8501 (GVE), CSC8506 (GVE)
A16	CSC3201 (GVE), CSC3202 (GVE), CSC3204 (GVE), CSC3503, CSC8203, CSC8506 (GVE), CSC8502 (GVE), CSC8503, CSC8108
A17	CSC3203 (GVE), CSC3204 (GVE), CSC3503, CSC8503
A18	CSC8312 (BC), CSC8307, CSC8311, CSC8306 (BC)
A19	CSC3XXX (BC), CSC3YYY (BC), CSC8312 (BC), CSC8305 (BC), MAS8401 (BC)
A20	CSC3XXX (BC), CSC3YYY (BC), CSC8312 (BC), BIO8009 (BC)
A21	CSC3XXX (BC), CSC3YYY (BC), CSC8305 (BC)
A22	CSC3XXX (BC), CSC3YYY (BC), CSC8305 (BC), MAS8411 (BC), CSC8206 (CS, NSIT, BC), CSC8312 (BC)
B1	**CSC1011, CSC1012, CSC1014, CSC1016, CSC2011, CSC2012, CSC2014, CSC2015,** CSC3001, CSC3002 (NSIT), CSC3003, CSC3004, CSC3005 , **CSC3095,** CSC3103 (NSIT), CSC3201 (GVE), CSC3202 (GVE), CSC3303, CSC3504, CSC8206 (CS, NSIT, BC), CSC8104, CSC8106, CSC8204, CSC8108, CSC8501 (GVE), CSC8506 (GVE), CSC8502 (GVE), CSC8503 (GVE), CSC8312 (BC), CSC8307, CSC8311
B2	**CSC1011, CSC1012, CSC1014, CSC1016, CSC2011, CSC2015,** CSC3005 , **CSC3095,** CSC3102 (NSIT), CSC3103 (NSIT), CSC8311, CSC8312 (BC), CSC8108, CSC8501 (GVE), CSC8502 (GVE), CSC8503 (GVE), CSC8204, CSC8104, CSC8506 (GVE), CSC8206 (CS, NSIT, BC)
B3	**CSC1011, CSC1012, CSC1014, CSC1016, CSC2011, CSC2012, CSC2013, CSC2015,** CSC3001, CSC3002 (NSIT), CSC3005 , **CSC3095,** CSC3103 (NSIT), CSC3202 (GVE), CSC8201 (CS, NSIT), CSC8105, CSC8106, CSC8102, CSC8503 (GVE), CSC8203, CSC8306 (BC), CSC8312 (BC), CSC8506 (GVE), CSC8206 (CS, NSIT, BC)
B4	**CSC1012, CSC1013/MAS1404, CSC1014, CSC1016, CSC2012, CSC2014, CSC2015, CSC2016,** CSC3003, CSC3004, CSC3005 , CSC3201 (GVE), CSC8312 (BC), CSC8305 (BC), CSC8503 (GVE), CSC8502 (GVE), CSC8102, CSC8103 (CS, NSIT), CSC8202, CSC8506 (GVE), CSC8206 (CS, NSIT, BC)
B5	**CSC1011, CSC1012, CSC1014, CSC1016, CSC2011, CSC2014, CSC2015, CSC2016,** CSC3001, CSC3002 (NSIT), CSC3005 , CSC3103 (NSIT), CSC3201 (GVE), CSC3202 (GVE), CSC3503, CSC8104, CSC8202, CSC8101, CSC8502 (GVE), CSC8503 (GVE), CSC8506 (GVE), CSC8206 (CS, NSIT, BC), CSC8108, CSC8305 (BC), CSC8312 (BC), CSC8307
B6	**CSC1011, CSC1012, CSC1014, CSC1015, CSC1016, CSC2012, CSC2013, CSC2015,** CSC3003, CSC3005 , CSC3101 (NSIT), CSC3103 (NSIT), CSC3104 (BC), CSC3202 (GVE), CSC8506 (GVE), CSC8206 (CS, NSIT, BC), CSC8306 (BC), CSC8108, CSC8104
B7	CSC3101 (NSIT), CSC3103 (NSIT), CSC8108, CSC8203, CSC8101
B8	CSC3101 (NSIT), CSC3102 (NSIT), CSC8201 (CS, NSIT), CSC8202, CSC8102, CSC8204

B9	CSC3103 (NSIT), CSC3104 (BC), CSC8104, CSC8105, CSC8102, CSC8106, CSC8108, CSC8103 (CS, NSIT)
B10	CSC3102 (NSIT), CSC3103 (NSIT), CSC3104 (BC), CSC8203, CSC8204, CSC8201 (CS, NSIT)
B11	CSC3201 (GVE), CSC3202 (GVE), CSC3204 (GVE), CSC3503, CSC8502 (GVE), CSC8503 (GVE), CSC8108, CSC8203
B12	CSC3201 (GVE), CSC3202 (GVE), CSC3204 (GVE), CSC8502 (GVE), CSC8501 (GVE)
B13	CSC3201 (GVE), CSC3202 (GVE), CSC3204 (GVE), CSC8503 (GVE), CSC8501 (GVE)
B14	CSC3203 (GVE), CSC8503 (GVE), CSC8501(GVE)
B15	CSC3XXX (BC), CSC3YYY (BC), MAS8401 (BC), CSC8305 (BC)
B16	CSC8312 (BC), CSC8206 (CS, NSIT, BC), CSC8307, CSC8311
B17	CSC8306 (BC), CSC8312 (BC), CSC8311
B18	CSC3XXX (BC), CSC3YYY (BC), MAS8401 (BC), CSC8305 (BC), CSC8307, CSC8312 (BC)
C1	**CSC1015, CSC1016, CSC2012, CSC2013, CSC2014, CSC2015,** CSC3001, CSC3002 (NSIT), CSC3003, CSC3006 (BC), **CSC3095,** CSC3102 (NSIT), CSC3103 (NSIT), CSC3201 (GVE), CSC3202 (GVE), **CSC8205,** CSC8201 (CS, NSIT), **CSC8498,** CSC8206 (CS, NSIT, BC), CSC8506 (GVE), CSC8312 (BC), BIO8009 (BC), CSC8503 (GVE), CSC8203, CSC8106, CSC8202
C2	**CSC1011, CSC1012, CSC1013/MAS1404, CSC1014, CSC1015, CSC1016, CSC2011, CSC2012, CSC2013, CSC2014, CSC2015, CSC2016,** CSC3001, CSC3003, CSC3004, CSC3005 , CSC3006 (BC), **CSC3095,** CSC3101 (NSIT), CSC3102 (NSIT), CSC3103 (NSIT), CSC3201 (GVE), CSC3202 (GVE), CSC3504, CSC8206 (CS, NSIT, BC), CSC8104, CSC8105, CSC8101, CSC8204, CSC8506 (GVE), CSC8501 (GVE), CSC8502 (GVE), CSC8503 (GVE), CSC8108, CSC8203, CSC8312 (BC), CSC8305 (BC), CSC8307, **CSC8498**
C3	**CSC1011, CSC1012, CSC1014, CSC1015, CSC1016, CSC2011, CSC2012, CSC2014, CSC2015, CSC2016,** CSC3003, CSC3006 (BC), **CSC3095,** CSC3102 (NSIT), CSC3103 (NSIT), CSC3201 (GVE), CSC3202 (GVE), CSC3503, CSC8307, CSC8306 (BC), CSC8312 (BC), CSC8108, CSC8203, CSC8503 (GVE), CSC8502 (GVE), CSC8204, CSC8104, CSC8103 (CS, NSIT), CSC8206 (CS, NSIT, BC), CSC8506 (GVE), **CSC8498**
C4	**CSC1011, CSC1012, CSC1013/MAS1404, CSC1014, CSC1016, CSC2011, CSC2012, CSC2014, CSC2015, CSC2016,** CSC3002 (NSIT), CSC3003, CSC3005 , CSC3006 (BC), **CSC3095,** CSC3101 (NSIT), CSC3102 (NSIT), CSC3103 (NSIT), CSC3201 (GVE), CSC3202 (GVE), CSC3503, CSC3504, CS8206, CSC8506 (GVE), **CSC8498**, CSC8106, CSC8204, CSC8501 (GVE), CSC8502 (GVE), CSC8503 (GVE), CSC8108, CSC8312 (BC), CSC8305 (BC)
C5	**CSC1016, CSC2011, CSC2012, CSC2013, CSC2014, CSC2015, CSC2016,** CSC3001, CSC3002 (NSIT), CSC3004, CSC3006 (BC), CSC3103 (NSIT), CSC3202 (GVE), CSC3503, CSC8311, CSC8306 (BC), CSC8203, CSC8106, CSC8105, CSC8202, CSC8201 (CS, NSIT), CS8206, CSC8506 (GVE), **CSC8498**

D1	**CSC1011, CSC1012, CSC1014, CSC1015, CSC1016, CSC2012, CSC2013, CSC2014, CSC2015,** CSC3002 (NSIT), CSC3003, CSC3006 (BC), **CSC3095,** CSC3201 (GVE), CSC3202 (GVE), CSC3303, CSC3503, **CSC8205, CSC8498**, CSC8201 (CS, NSIT), CSC8202, CSC8506 (GVE), CSC8206 (CS, NSIT, BC), CSC8203, CSC8312 (BC), CSC8305 (BC)
D2	**CSC1011, CSC1012, CSC1013/MAS1404, CSC1014, CSC1015, CSC1016, CSC2011, CSC2012, CSC2013, CSC2014, CSC2015, CSC2016,** CSC3001, CSC3002 (NSIT), CSC3004, CSC3005 , CSC3006 (BC), **CSC3095,** CSC3101 (NSIT), CSC3102 (NSIT), CSC3103 (NSIT), CSC3201 (GVE), CSC3202 (GVE), CSC3503, CSC8312 (BC), CSC8305 (BC), CSC8206 (CS, NSIT, BC), MAS8401 (BC), CSC8307, CSC8503 (GVE), CSC8502 (GVE), CSC8506 (GVE), CSC8106, CSC8105, CSC8103 (CS, NSIT), **CSC8498**
D3	**CSC1015, CSC2014, CSC2015,** CSC3004, CSC3006 (BC), **CSC3095,** CSC3303, **CSC8205, CSC8498**, CSC8201 (CS, NSIT), CSC8202, CSC8506 (GVE), CSC8206 (CS, NSIT, BC), CSC8203, CSC8312 (BC), CSC8305 (BC)
D4	**CSC1011, CSC1012, CSC1013/MAS1404, CSC1014, CSC1015, CSC1016, CSC2012, CSC2014, CSC2015,** CSC3002 (NSIT), CSC3003, CSC3004, CSC3005 , CSC3006 (BC), **CSC3095,** CSC3102 (NSIT), CSC3201 (GVE), CSC3202 (GVE), **CSC8205, CSC8498**, CSC8201 (CS, NSIT), CSC8202, CSC8506 (GVE), CSC8206 (CS, NSIT, BC), CSC8203, CSC8312 (BC), CSC8305 (BC)
D5	**CSC1015, CSC2015,** CSC3006 (BC), **CSC3095, CSC8205, CSC8498**, CSC8206 (CS, NSIT, BC), CSC8506 (GVE)
D6	**CSC1011, CSC1012, CSC1013/MAS1404, CSC1014, CSC1015, CSC1016, CSC2015, CSC2016,** CSC3006 (BC), **CSC3095,** CSC3102 (NSIT), CSC3202 (GVE), **CSC3095, CSC8205, CSC8498**, CSC8206 (CS, NSIT, BC), CSC8506 (GVE)
D7	**CSC1015, CSC2015,** CSC3004, CSC3006 (BC), CSC3303, CSC8206 (CS, NSIT, BC), CSC8506 (GVE)
D8	**CSC1013/MAS1404, CSC2014, CSC2015, CSC2016**, CSC3005 , CSC3102 (NSIT), CSC3201 (GVE), CSC3202 (GVE), CSC8105, CSC8503(GVE), CSC8502(GVE), CSC8305 (BC), MAS8401 (BC)
D9	**CSC1011, CSC1012, CSC1014, CSC1015, CSC1016, CSC2012, CSC2014, CSC2015,** CSC3003, CSC3006 (BC), **CSC3095,** CSC3201 (GVE), CSC3202 (GVE), CSC3303, **CSC8205, CSC8498**, CSC8206 (CS, NSIT, BC), CSC8506(GVE), CSC8306 (BC), CSC8203, CSC8101
D10	**CSC1011, CSC1012, CSC1014, CSC1015, CSC1016, CSC2011, CSC2012, CSC2014, CSC2015, CSC2016,** CSC3001, CSC3002 (NSIT), CSC3003, CSC3005 , **CSC3095,** CSC3103 (NSIT), CSC3201 (GVE), CSC3202 (GVE), **CSC8205, CSC8498**, CSC8206 (CS, NSIT, BC), CSC8506 (GVE), CSC8202, CSC8204, CSC8503 (GVE), CSC8502(GVE), CSC8108, CSC8203, CSC8312 (BC), CSC8311