# SCHEME FOR THE AWARD OF HONOURS IN

# MATHEMATICS (2020-21)

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| | *BSc (3yr)* | *BSc (4yr)* | *MSci (4yr)* |
|---|---|---|---|
| Mathematics | G100 | - | G103 |
| Mathematics with Mathematical Computation | G102 | - | - |
| Mathematics with Applied Mathematics/Mathematical Physics | G1F3 | - | - |
| Mathematics with Statistics | G1G3 | - | - |
| Mathematics (Pure Mathematics) | G125 | - | - |
| Mathematics, Optimisation and Statistics | GG31 | - | - |
| Mathematics with Statistics for Finance | G1GH | - | - |
| Joint Mathematics and Computer Science *(with Imperial College Dept. of Computing, who administer the degree.)* | GG14 | - | GG41 |
| Mathematics with a Year Abroad *(Joint with various Overseas Institutions)* | - | - | G104 |

The current list of modules on the undergraduate programme is contained within the overall course guides, together with further detail about the forms of assessment for and specific degree coding requirements. Information appropriate to each year of the course is contained within the corresponding Year Guides.

The main features of the degree programmes are contained in the Programme Specifications.

**The information given here relates to assessment practices for undergraduate modules within the Department of Mathematics in the year 2020-21.** It therefore contains information relating to two different curricula and sets of Degree Regulations. It supplements information in the College Regulations, Programme Specifications and Module Outlines/ Year Guides appropriate to the year of study.

Professor David Evans
Director of Undergraduate Studies
September 2020.

## (1)    MARKS AWARDED IN MATHEMATICS

### SCALING

Within the Department the total raw mark from each module assessment is rescaled in the following manner so that overall performances from different modules may be compared.

Rescaled marks are on a 0-100 scale. For each module, numbers P, T, E & M are selected so that P raw marks corresponds to the pass mark (40 scaled marks on year 1, year 2, year 3 modules; 50 on year 4 modules and the Introductory year 1 module), T raw marks corresponds to the 2:1/2:2 boundary at 60 scaled marks, while E corresponds to the 1st class border of 70 scaled marks, while the nominated maximum mark M scores 100 scaled marks.

The raw marks (including any coursework marks) corresponding to P,T,E,M are normally chosen in the first instance by the setter of the examination paper, in discussion with any other markers.  Each examination question is marked to a tight mark scheme. There are specific guidelines for the ranges where each of P, T, E and M are expected to be set and the values chosen should reflect the perceived difficulty of the assessment.  The use of P, T, E and M is designed to ensure comparability between different modules and fairness to all students who may take different options.  Further adjustments to P, T, E and M can be made when the results of all separate modules are considered by the Departmental Liaison Panel.   Here the distributions for each individual module are compared to all others in the same year - this is essential given the wide variation in options chosen by the Third/Fourth Year students.   As part of this Liaison process marks awarded for module options taken in other departments of the College can also be reviewed, so that adjustments can be made if necessary.

The External Examiners may recommend modifications to PTEM when they consider the scaled marks for each individual module and all students, although change is uncommon at this juncture.

Once the final marks are agreed by the Exam Board, they are considered to be on the official College scale. Reporting of marks on course transcripts is communicated to students on the College Scale.

### PROJECTS

All projects are subject to 1st marking, 2nd marking, and moderation.

**For students in years 1 and 2 in 2020-21:**  For the First Year Individual Research Project MATH40008, marks are awarded on a  0-100 scale, normally with the values P=40, T=60, E=70 & M=100.  Marks are awarded for presentation, basic content and oral explanation. Thus, a mark of 40 is necessary to pass the project. At least two markers assess each project and the respective marks are aggregated.

For the Second Year Group Project MATH50002, marks are normally awarded on a 0-100 scale with the values P=40, T=60, E=70 & M= 100. Marks are awarded for presentation, basic content, teamwork and initiative. Almost always these are common marks for all members of each group (currently comprising 80% of the total).  A mark individual to each student (currently 20% of the total) is awarded for their part in a short oral presentation by the entire group.

**For students in years 3 and 4 in 2020-21:**

For the Third Year 8 ECTS optional individual project M3R (for BSc only), marks are normally awarded on a 0-100 scale with P=40, T=60, E=70 & M=100.  Raw marks are awarded as appropriate for characteristics including Presentation and Structure (style, clarity, format, organisation, referencing), Basic Content (mathematical level and complexity, accuracy of argument, correctness of results), Student Initiative and Further Work (initiative, independence, novelty of the work, and/or in the analysis of referenced sources, suitability for publication and/or conference presentation).  Such a mark is also included for an Oral Presentation, including Delivery, Mathematical Content, Enthusiasm and Initiative.

For the Fourth Year 16 ECTS compulsory individual project M4R, the marking categories are as above, but the project has double weighting to reflect its equivalence to two lectured modules.

Details of the guidelines for 3rd/4th year project marking are included in **(8)** below

**YEAR TOTALS**

**For students in years 1 and 2 in 2020-21:**

Year totals are produced by weighting individual module marks in proportion their ECTS value. The module Introduction to University Mathematics MATH40001 is pass/ fail and not included in the first-year total. The chosen compulsory i-Explore/ Horizonsmodule is not included in the second-year total.

**For students in years 3 and 4 in 2020-21:**

A Third Year mark out of 800 is made up from 8 lectured modules, $8\times100$, of which, for the BSc only, one module may be the M3R project.

A Fourth Year mark out of 800 is made up from 6 lectured modules $6\times100$ and $1\times200$ (M4R Project).

**All students:**

For ease of comparison between years, totals are expressed as percentages and made available to individual students on Blackboard or MyImperial.

The Year Totals for each student are combined with the weighting appropriate to the degree coding [see **(4)** below] and then considered for overall Honours [see **(5)** below].

## (2) CRITERIA FOR PROGRESSION TO THE FOLLOWING YEAR OF THE COURSE

**All students:**
Candidates who fail any examination are considered individually.

Students must (normally) pass every module in order to progress into the next year of the course or to graduate in their final year. Students who do not obtain Passes in modules at the first attempt will be expected to attend resit (reassessment) examinations.

Two resit attempts are normally available to students in Years 1 and 2. The first resit opportunity for all 1st and 2nd year examinations is in September. The second resit opportunity will be in May the following year.

In the 3rd and 4th years, resits are not normally available until the following year.

Students who pass resit examinations normally receive a mark capped at the pass mark. Once a Pass is achieved, no further attempts are permitted.

Those students who do not qualify to proceed at the start of an academic year are normally required to withdraw for a year and are invited to resit their failed modules the following summer. Rarely, they may be permitted to retake the entire year, but only if there are sufficient extenuating circumstances.

**For students in years 1 and 2 in 2020-21:**
Students in Year 1 who pass less than 20 ECTS credits in their first attempt will normally be instructed to terminate their studies and withdraw from the College without any resit attempts.

For the Introductory module MATH40001, there will be additional resit opportunities in January, May and September of year 1.

In determining whether a year 1 or 2 Mathematics module has been passed at a resit attempt, if a resit exam has been passed, then the Board of Examiners may discount any module marks obtained from coursework and award an overall pass mark for the module.

In Years 1 and 2, compensation will normally only be applied after a re-assessment attempt. All compensation decisions are at the discretion of the Board of Examiners.

**For students in years 3, 4 in 2020-21:**
In the 3rd and 4th years, resits are not normally available until the following year. In 2020-21 the Examination Board may recommend that final year failures be compensated, and that a student may graduate. This is only permissible if the student has averaged a pass in each of two course bundles, normally comprising the 1st term modules and 2nd term modules. If students have chosen different numbers of options in the two terms, modules may be transferred from one bundle to the other to ensure equal ECTS counts. If the Examination Board does not (or cannot) compensate one or more failed modules, then normally the student must resit the following summer.

**For students in years 1, 2, 3, 4 in 2020-21:** For the MSci degree codings G103, G104 students normally must have achieved a sufficient standard to qualify for admission to the 3rd and 4th years. A second-year student registered for the MSci who has not maintained a satisfactory academic record -- at the level of 60 percent from their second year – will normally be required by the Department to transfer at the end of the second year to the third year of a suitable BSc course. Students on G103 who achieve a 3rd year mark of less than 58 percent may be graduated with a BSc after their 3rd year. For G104, a sufficient standard both in Mathematics and in any required language must be attained in order to spend the 3rd year abroad. A G104 student with an unsatisfactory year-abroad performance may be transferred onto a BSc coding for their 4th year and their years weighted as 1:3:0:5.

### (3)    DEGREE CODING COURSE REQUIREMENTS in MATHEMATICS

All modules within the Department are registered for G100, G103 Mathematics (with the exception that M3R is not permitted as part of G103). To qualify for a degree a student must satisfy the overall College and University requirements.

For the other degree codings, there are special requirements in terms of option selection [see the overall Course guide], which vary slightly from year to year according to option availability. If these are not satisfied, then a G100 degree will be awarded. The Examination Board has the power to permit specialist codings for "near misses," if appropriate.

### (4)    WEIGHTING OF EACH YEAR OF THE DEGREE COURSES

These are given in the appropriate Programme Specification.

### (5)    THE HONOURS CLASSIFICATION IN MATHEMATICS

**The text in this section refers to students graduating in 2020-21.**

Students are expected to pass every course element assessment in order to graduate, although some fails in the **final** year may be compensated as described in (2).

**Honours Classification**

Graduating candidates will be classified at the Examiners' meeting (EPAB) within the Department in accordance with the following guidelines. The scaled marks gained on the Mathematics scale, are added within each year and weighted with the appropriate year scaling [see (**4**)]. The total mark is expressed to 1 decimal place out of 100.

The philosophy for class divisions is as follows: We strive to maintain the standards of the degree, so that a 1st in Maths at Imperial should mean the same as in previous years. Although all years count, and the final year has the highest weighting, it is considered that the final year is undervalued at the highest levels. Thus a very good final year may qualify a student for being raised a class, at the discretion of the External Examiners and the Examination Board. There is no fixed quota for the annual proportions of 1sts, 2:1s etc.; however, these numbers may be taken into account in the case of borderline decisions.

The strategy for class divisions is as follows: Borderline candidates with a possibility for promotion to a higher class are identified at a preliminary meeting of the Mathematics Sub-Board They are reviewed by the External Examiners and are finalised at the Examiners' Meeting (EPAB). Candidates close to the boundaries are considered individually. In the absence of special circumstances, only candidates within -2.5 marks of the final boundaries may be considered for raising. For candidates with special circumstances, a -5.0 mark band

may be considered. A candidate may be raised to a class above another with a higher total, but there must be good reason.

The External Examiners will be asked to consider carefully candidates in the "borderline" bands. They will examine their final year marks and scripts and may even call candidates for interview, though this is very rare. They will present their considered recommendations at the Examiners meeting, which will then consider each candidate in turn.

The total mark bands for guaranteed degree classification are:

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|---|---|
| First Class | at least 70.0 |
| Upper Second Class | 60-67.5 |
| Lower Second Class | 50-57.5 |
| Third Class | 40-47.5 |

An overall mark will be included on the final transcripts, to provide a single indicator of the degree standard.

## (6)     MATHEMATICS AND COMPUTER SCIENCE

Students on the joint Mathematics and Computer Science degree codings GG14, GG41 are considered at a separate meeting of a joint sub-board. This course is administered by the Computing Department, in the Faculty of Engineering. Total marks from Mathematics and Computing are combined with the appropriate weighting onto a single scale and the procedure then adopted is essentially as given above in (5).

## (7)      MATHEMATICS WITH A YEAR ABROAD
*[See also the Course Guide for specific detail.]*

**The text in this section refers to students graduating in 2020-21.**

Students on the year abroad degree coding G104 are considered at the same Final Examiners' Meeting (EPAB) (see (5)) as those students who have not been away.

Before going abroad there may be specific language requirements which must be met. Students who do not meet these requirements must take language options and pass them at an appropriate level. Marks from these modules do not count towards overall marks, but will appear on student transcripts. In the Third Year, students follow an approved set of modules at the host institution, where they are also assessed. Criteria for entry into the following year of the course are normally on the same basis as for other mathematics codings (see (2) above). The Department endeavours to send abroad only strong students of MSci quality.

When students return to College for Fourth Year studies, they are expected to take on a programme of study in line with the G103 MSci programme.

Transfer from G104 onto a three year Mathematics course is only possible with the permission of the Department.  This permission will not normally be given *after* undertaking study abroad, although transfer might be *required*. Following an unsuccessful year abroad, the department may transfer a student onto the BSc G100. After such a transfer, the normal requirements for Mathematics degrees apply.

Marks recorded for the 'year abroad' are treated very carefully and sympathetically, particularly because different countries and institutions are involved.  We carry out various calculations, moderating the year abroad marks, precisely to avoid any student being 'significantly disadvantaged', or for that matter 'advantaged' by the different systems.
These calculations are reviewed by the External Examiners. For students graduating in 2020-21, in exceptional circumstances, the Board may choose to exercise its authority to disregard the year abroad mark when classifying a student's degree, although the mark will be incorporated into the overall total appearing on the student's transcript.

## (8) GENERAL GUIDELINES FOR CLASSIFICATION AND STANDARDS

The qualities that a student of Mathematics must exhibit to get excellent marks may include: diligence, understanding of theory, ability to choose appropriate theory and to apply it, ability to relate different parts of the course, appreciation of elegance, flair.

For individual course examinations, coursework and projects, a 1st class performance demonstrates excellence in all or most of these qualities. A 3rd class demonstrates mostly basic performance in these qualities. Some 2nd class performances are uniform, while others demonstrate a balance between definite strengths and particular weaknesses. This is primarily because any wrong choice of method of approach and/or various levels of algebraic and numerical slips in mathematical work do still allow (through the assessment mark schemes) for partial credit to be given.

Overall performance by a particular student on a particular degree programme may also be non-uniform with regard to different flavours of Mathematics within the programme. However scaling (see (1) above) and the weighting of individual modules/years within the overall degree assessment (see (4) above) mean that candidates are not awarded a class of degree where they have not shown evidence of sufficient work falling within (at least) that class.

## EXAMINATION MARKING GUIDELINES

All Maths assessments have detailed mark schemes. These are set in accordance with the following guidelines which indicate the general criteria expected in examination scripts or coursework:

> 1st FIRST CLASS HONOURS
> Very wide knowledge of the material. Very good ability to apply theory and methods to standard and to unfamiliar problems. Evidence of mathematical insight shown, for example, by giving concise, clear arguments. Attention to precise conditions of validity as appropriate. Careful, sound and accurate work carried out under time limitations.

> 2:1 UPPER SECOND CLASS HONOURS
> Good knowledge of the material. Ability to apply theory and methods with confidence to a range of problems. Evidence of understanding as demonstrated by a clear style of mathematical writing. A good level of sound and accurate working.

> 2:2 LOWER SECOND CLASS HONOURS
> Sound knowledge of the majority of the material. Good ability to solve straightforward problems and examples. Evidence of pursuing multistep arguments with reasonable accuracy.

> 3rd THIRD CLASS HONOURS
> Basic, but limited, knowledge of the material shown. Appropriate mathematical methods applied in simple cases – not always accurately. Unfamiliar examples addressed in part and maybe with difficulty. Arguments developed, but incompletely

> FAIL Work submitted will not, in the opinion of the Examiners, achieve the minimum acceptable for Third Class Honours to be awarded.
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## M3R AND M4R PROJECT MARKING GUIDELINES

**The text in this section refers to students graduating in 2020-21.**

By their nature, projects are harder to mark precisely and objectively. Markers are required to give reasonably detailed comments and to justify the marks awarded. The following more detailed guidelines for markers are recommended:

**91-100** Of publishable standard as it stands - contains good original work, explained very well, with very good account of and references to existing work. Excellent presentation.

**84-90** Almost of publishable standard - containing good original work, explained very well,

with very good account of and references to existing work. Good presentation.

**75-83** Some original work, explained well, with good account of, and good references to, existing work.

*Above 74 is a clear 1st class standard, and the criterion for this should be the presence or absence of original work or insights. Marks in the 70-74 range are borderline 1st/2:1. If a mark is just below 70, the reason for this should be stated clearly.*

**70-74** Some original ideas, not developed far enough to reach a useful result; the work still explained well and with good account of and references to existing work. A possible, but not clear 1st.

**60-69** Some good ideas, not developed far enough to reach a useful result; fair explanation of the work and with some account of and references to existing work.

*Below this point the project would not be of 2:1 standard. Below here we are looking at projects which only review the problem without seriously attempting to obtain anything new. If a mark is just above or below 60, the reason for this should be stated clearly.*

**50-59** An explanation of the problem and the work of others on it, but without much independent work of the candidate's own.

*Below 50 is a failing mark for M4R projects  - this should only be for projects where there is strong doubt as to whether the student is in command of the material. If a mark is just above or below 50, the reason for this should be stated clearly.*

**40-49** As above but in some way defective - for example one from:  few references, some unclear text, poorly presented; however still showing some understanding.

*Below 40 is a failing mark for M3R projects  - this should only be for projects where there is strong doubt as to whether the student is in command of the material. If a mark is just above or below 40, the reason for this should be stated clearly.*

**30 - 39** Poor understanding; several of: few references, some unclear text, poorly presented. If significant material is quoted, verbatim, from a cited source, without evidence that the student understands it, no mark higher than 29 should be given.

**20-39**  Very poor understanding; few references, unclear text, poorly presented.

**0- 19**  No evidence of understanding; scant references, unclear text, very poor presentation.

**Notes on project guidelines**

i. While original research is desirable wherever feasible, in some areas a suitable project might be to apply, implement or explain a known result. A report which clarified a known cited result, presenting it more clearly than the published source, might deserve a mark in the 80-89 range, and a higher mark would be justified if there were evidence of a new insight, e.g. if the relationship between known results was clearly discussed.

ii. A report which was written in the candidate's own words, to the standard of a chapter of an undergraduate textbook, would be regarded as "publishable" with regard to its presentation.

iii. While original work is not needed for a Pass, some original ideas are needed for a 2:1, and they should be well developed to justify a 1st. All project topics should be of such a level that a first class mark could be justified for excellent work on them.

iv. Of course verbatim quotes from uncited sources are treated as plagiarism, or at best, as poor academic practice. Such cases will generally be referred to Registry.

**The main features of the degree programme, and the learning outcomes that a typical student might reasonably be expected to achieve, if he/she takes full**

advantage of the learning opportunities that are provided, are summarised in the programme specifications – these have been constructed in accord with the QAA subject benchmarking for Mathematics, Statistics and Operational Research.