

On-line practical registrations for Part IA subjects in the Natural Sciences Tripos

version 1 – 18 February 2005
version 2 – 25 February 2005
version 3 – 1 March 2005

Purpose

The major outcome is to deliver an on-line registration system for all students reading subjects within Part IA of the Natural Sciences Tripos, such that all students registered would be provided with an electronic timetable of their lectures and associated practical classes.

The system is to be developed to save both students and staff in the associated subjects/Departments time and effort in the registration of practicals. Currently, individuals may spend up to eight hours registering for the various practical classes.

The system will also minimise the difficulties that arise in registering students (including identifying clashes and minimising the number of students who have to change their practical sessions after they have registered).

Reasons

The main reasons for this new system of practical registration are:

- an inability of the current system to accurately allocate students equally across existing practical sessions for any one subject;
- difficulties in co-ordination across subjects to accommodate all students in all subjects;
- a growing dissatisfaction with the current process;
- the large amount of time it takes for individual students to register for all practical classes;
- the large amount of resources that Departments have to commit to this exercise.

Options

| | | |
|----------|--|--|
| Option 1 | Retain the current system | REJECTED Retained as “Plan B” option |
| Option 2 | Modify current system for delivery over a web-based facility: students are provided instantly with allocated practical times | NOT FAVOURED The current system requires each subject to “balance” their classes after registration by moving students – may cause confusion |
| Option 3 | Develop a new system where all students register subjects and are then provided with their timetable at a later date | PREFERRED OPTION |

Benefits

| Who | Benefit | When |
|-----------------|---|---|
| Students | Large saving of time commitment (several hours) for practical registration | Time saving would be made in the days before lectures start |
| | Provision of individualised timetable (clarity) | Provided before lectures start by email |
| Subjects | Large time saving of time commitment (several hours) by course organisers and technical assistants in the registration process | Time saving would be made in the days before lectures start |
| | Provision of student lists, including CRSIDs | Provided before lectures start by email |
| | More accurate and complete student information | Provided before lectures start by email |
| | Less student dissatisfaction registered to individuals | |
| DoSs | Better co-ordination of student subject choices | |
| CARET | Product will provide insight into student registration processes and provide better links into other projects (<i>e.g.</i> Coursework) | |

Risks

| Risk | Prob. | Impact | Minimisation |
|--|--------|--------|---|
| Subjects not agreeing to use system | Low | Medium | NST Ctte to negotiate if necessary |
| NST DoSs not aware of changes | Low | High | DoSs to be involved in production of spec. Use of DoS email list and Tutorial office channels in providing information |
| Other DoSs not aware of changes | Medium | Low | Email lists for other DoS groups to be identified Use of Tutorial office channels |
| DoSs not having access to Web | Low | Low | Provide alternative route for data entry |
| CARET do not provide the web-based product | Medium | High | Use current system (Option 1) if necessary |
| Power shortage on days system used | Low | High | Use current system (Option 1) if necessary |

Outcomes and Timescales

The web-based system, including testing, will need to be produced by CARET by August 2005, to allow time to communicate the new process and registration procedures to all affected Directors of Studies.

A decision about whether to proceed with the new system will need to be taken at the end of August 2005, to allow time for Departments and subjects to organise contingency plans.

Costs and Resources

CARET have agreed to provide a system, to specifications to be agreed, on a no-cost/no-guarantee basis. Resources for the ongoing and future maintenance and updating of the system (*e.g.* timetable changes) still need to be identified.

System requirements

1 Overview

In Part IA of the NST, all students select three experimental subjects (out of seven) and one mathematics subject (out of three). Each subject provides a number of sessions of identical practical classes (or examples classes), so that all students can be accommodated for all subject combinations (105 in theory).

Increasing student numbers and the size of laboratories have led to greater restrictions on which sessions students can be allocated in order that all students can be placed. Since 2002-3, a system has been in place whereby students are *told* their practical sessions, rather than allowed to choose them and this has met with little or no controversy.

The major weakness in the current system is that students are processed one at a time, by different people throughout the University, leading to identified difficulties:

- a large amount of resource (people and time) from the subjects/Departments concerned;
- students who register late may find that their only possible subject combination is full, leading to;
- a number of students having to be told *after* registration that they need to change sessions.

The system should instead be designed to receive all student subject information electronically and then proceed to allocate (in a “best fit” arrangement) according to a number of defined see section 3).

2 Data Input

2.1 from subjects/Departments

The University operates in eight-week Terms, which run from Thursday to Wednesday. The NST operates a fortnightly timetable, indicating odd and even weeks throughout each Term. The timetables to be constructed for students will need to work in this fortnightly cycle. Lectures for all subjects (within the NST) do not overlap, but practical sessions do. Lectures are timetabled 9am to 1 pm on all days except Sundays.

Currently, the timetable for practical sessions is quite static, but we cannot assume that this will be true in the long-term. The system should be designed for the duration and number of practical classes to be changed – perhaps a series of “masks” can be drawn up for each subject, which may be updated annually. The information would be inputted by the system administrator, and not directly by the subjects/Departments. An example for two different “masks” in Chemistry is given below (there would be ten in total):

(a) Practical session – Friday (odd weeks only)

| | Th(1) | F(1) | Sa(1) | M(1) | Tu(1) | W(1) | Th(2) | F(2) | Sa(2) | M(2) | Tu(2) | W(2) |
|-------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|
| 9-10 | | | | | | | | | | | | |
| 10-11 | Lect | Prac | Lect | |
| 11-12 | | Prac | | | | | | | | | | |
| 12-1 | | Prac | | | | | | | | | | |
| 1-2 | | | | | | | | | | | | |
| 2-3 | | Prac | | | | | | | | | | |
| 3-4 | | Prac | | | | | | | | | | |
| 4-5 | | Prac | | | | | | | | | | |
| 5-6 | | | | | | | | | | | | |

(b) Practical session – Friday (even weeks only)

| | Th(1) | F(1) | Sa(1) | M(1) | Tu(1) | W(1) | Th(2) | F(2) | Sa(2) | M(2) | Tu(2) | W(2) |
|-------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|
| 9-10 | | | | | | | | | | | | |
| 10-11 | Lect | | Lect | | Lect | | Lect | Prac | Lect | | Lect | |
| 11-12 | | | | | | | | Prac | | | | |
| 12-1 | | | | | | | | Prac | | | | |
| 1-2 | | | | | | | | | | | | |
| 2-3 | | | | | | | | Prac | | | | |
| 3-4 | | | | | | | | Prac | | | | |

| | | | | | | | | | | | | |
|-----|--|--|--|--|--|--|--|------|--|--|--|--|
| 4-5 | | | | | | | | Prac | | | | |
| 5-6 | | | | | | | | | | | | |

Currently, the lecture and practical timetables for each of the subjects are:

| Subject | Lectures | Practicals | |
|---------------------------|--|--|--|
| Biology of Cells | F.M.W.10 | 1 weekly | F.M.W.11-5 (provision made for clashing lectures) |
| Chemistry | Th.Sa.Tu.10 | 1 fortnightly | Th.F.M.Tu.W.10-5 (provision made for clashing lectures) |
| Ev. & Beh. | Th.Sa.Tu.11 | 1 fortnightly | M.Tu.12-5 |
| Geology | F.M.W.11 | 3 weekly | Set 1: F.12-1, Sa.10-11, M.9-10, M.10-11 one from each Set Set 2: M.12-1, Tu.10-11, W.9-10, W.10-11 Set 3: Th.10-11, F.9-10, F.10-11, W.12-1 |
| Mat. & Min. Sci. | F.M.W.12 | 2 weekly | Set 1: M.2-4, Tu.11-1, W.10-12, W. 2-4 one from each Set Set 2: Th.11-1, F.10-12, F. 2-4, M.10-12 |
| Physics | F.M.W.9 | 1 fortnightly | Th.F.M.Tu.2-6 |
| Phys. of Org. | Th.Sa.Tu.12 | 1 weekly | F.W.12-5 |
| EMB | F.M.9 | 1 weekly | W.9 |
| Mathematics (+ Computing) | Th.Sa.Tu.9 Sa.11 | 2 weekly 1 weekly | W.4.30-6 sessions not held every week Tu.Th.11 not practicals, but additional lectures |
| Quant. Biology | Th.Sa.Tu.9 | 1 weekly | Th.2-3.15 or Th.3.30-4.45 or Th.4.45-6 |
| Comp. Sci. 25% | Th.Sa.Tu.12 | 1 weekly | Th.2-6 |
| Comp. Sci. 50% | Th.Sa.Tu.11 Th.Sa.Tu.12 | 1 weekly | Th.2-6 |
| Mathematics | F.M.W.10 Th.Sa.Tu.10 F.M.W.11 Th.Sa.Tu.11 | none | |
| Education Studies | unknown | DoSs/students will need to inform the system administrator of their timetables | |

Departments will also need to indicate the maximum number of places in each practical session. **The data below is incomplete and will need to be determined and/or confirmed:**

| Subject | No. of repeated sessions | No. of places per session | Recent number of students in subject |
|----------------------|--------------------------|---------------------------|--------------------------------------|
| Biology of Cells | 3 | 120 | 370 |
| Chemistry | 10 | 45 | 470 |
| Ev. & Beh. | 4 | ?????? | 200 |
| Geology | 4 | ?????? | 130 |
| Mat. & Min. Sci. | 4 | ?????? | 150 |
| Physics | 8 | ?????? | 380 |
| Phys. of Org. | 2 | 120 | 240 |
| EMB | -- | -- | 60 |
| Mathematics | -- | -- | 470 |
| Quantitative Biology | 3 | ?????? | 180 |

In addition, subjects/Departments may wish to include other information about the course (although students may be better directed to Coursework). Topics that Departments currently alert students to include:

- signing up for field trips or other courses related to the subject/Department;
- the sale of calculators, lab coats *etc.*
- where to obtain course handbooks *etc.*
- induction lectures (health and safety, study skills *etc.*)

2.2 from Colleges

Students from a number of Triposes may take subjects from Part IA of the NST. The Triposes include:

| | |
|--|--|
| Part IA Natural Sciences Tripos | students take one maths. subject and three experimental subjects |
| Part IA Computer Sciences Tripos (50%) | students take Mathematics and one experimental subject |
| Part IA Computer Sciences Tripos (25%) | students take Mathematics and two experimental subjects |
| Part IA Mathematical Tripos | some students take Physics |
| Part I Education Studies Tripos | some students take one or two subjects |

Individual Colleges will need to decide and authorise people to enter in data on behalf of the students. It would generally be anticipated that this would include the Directors of Studies in Natural Sciences, tutorial administrators, but may include Directors of Studies in other Triposes.

It is not anticipated that students will be entering the data themselves, although that might be a feature to consider for a future revision of the system. In the first instance, it is intended that the number of users is kept to a minimum, to monitor completion of data entry and for security purposes.

It is likely that the system will use a single username and password to access data input, and that the details of the person inputting the data will therefore not be recorded.

2.3 from system administrator

As mentioned above, the timetables for individual subjects/Departments will be entered by the system administrator. He or she would also be able to enter data on behalf of the Colleges with no additional systems being required.

In addition to student data being entered by the Colleges, a facility will exist for the system administrator to “hardwire” timetables for individual students prior to the allocation process. Examples of this being required include:

- students with special needs known prior to matriculation (*e.g.* regular hospital appointments, disabilities which may constrain rapid movement between classes)
- students taking papers by special leave (*i.e.* have rigid timetables due to irregular combinations of papers and are not accounted by the timetables built into the system)

The system administrator will also provide the text for the “covering note” part of the emails sent individually to students.

2.4 from Computing Service

In order for students to be identified uniquely and be provided with an individual timetable, it will be necessary for the Computing Service to provide the system with student details, including:

- name;
- College;
- CRSID

for all students who matriculate to read any of the Triposes mentioned in 2.2 above.

3 Data Output

3.1 to individual students

Each student should receive an individual email, which would contain:

- a general message, supplied by system administrator;
- confirmation of their subject choices, generated by the system;
- an individualised fortnightly timetable indicating lectures and practicals, generated by the system;
- information on clashes (where relevant), supplied by system administrator;
- information about Coursework, supplied by CARET;
- subject-specific information, supplied by subjects/Departments through system administrator

3.2 to each subject/Department

Individual subjects/Departments will be provided with a report containing lists of students (name, College and CRSID) attending the individual practical sessions.

3.3 to the system administrator

The system administrator would receive copies of the reports sent to individual subjects/Departments.

In addition, the system administrator should receive summary information on the allocations, including the total number of students taking each subject, and the number of students taking each combination of subjects (whether two, three or four subjects).

3.4 to Colleges?

At present, there is no requirement for Colleges to receive any reports.

4 Data Processing Criteria

4.1 Criteria to be used (taken from previous system)

These are listed in order of priority and may need to be revised or further qualified:

1. Do not have any lecture/practical or practical/practical clashes (but see 4.3 below)
2. Where the number of students does not exceed the total number of places available, do not allow any one practical session to exceed the maximum number of places allocated for that session
3. Wherever possible, assign Chemistry and/or Physics and/or Evolution and Behaviour practicals on the same day, but in opposite weeks (all use fortnightly cycles of practical sessions)
4. Allocate students such that the practical sessions in each individual subject/Department are even
5. Allocate students from the same Colleges in the same practical sessions (whether they are taking the same subject combinations or not) – this is particularly important for, or may be limited to, outlying Colleges: Girton, Homerton (this is to allow supervision arrangements to be made more easily)

4.2 Strategies used in previous system

- Group Geology practicals together into a lecture-pattern and wherever possible treat as another set of lectures (this is not necessary, but helped to simplify the allocations in the previous system – see 4.4 below)
- Place students in practicals that start at either 10 or 11 first (Biology of Cells, Chemistry), paying due heed to permitted and unavoidable clashes (see 4.3 and 4.4 below)
- Place students in practicals with fewest sessions next (Evolution and Behaviour, Physiology of Organisms)
- The most difficult subject combination is **Cells, Chemistry, Phys. of Org.** (practicals have to be on M.W.F. for all subjects); 50% of Phys. of Org. students take this combination
- Provide guidance to individual subjects/Departments on how they can move students to other “less-popular” sessions after registration (*i.e.* students allocated in “clumps” according to subject combination and then moved about to even out the numbers of student in each practical session)
- Previous systems have not taken into account the mathematical subject that students have read: Quantitative Biology practicals on Thursdays have not presented insurmountable problems in the past (because most students are only taking biological subjects, which don’t have practical sessions on Thursdays).

4.3 Lecture/practical clashes – permitted

A very few permitted subject combinations lead to lecture-practical clashes which are unavoidable:

| Subject 1 (practical) | Subject 2 (lecture) | Avoidable ? | Notes |
|-----------------------|---------------------|-------------|--|
| Biology of Cells | Geology | NO | attend Geology lecture; start Cells practical an hour later |
| Biology of Cells | Mat. & Min. Sci. | NO | leave in middle of Cells practical for MSM lecture |
| Chemistry | Biology of Cells | YES | start Chemistry practical an hour later |
| Mathematics | Ev. & Beh. | NO | attend Computing course in a separate session out of Term |
| Ev. & Beh. | Mat. & Min. Sci. | NO | attend MSM lecture; start E&B practical later |
| Geology | EMB | NO | will need an irregular pattern of Geology practicals (see below) |
| Phys. of Org. | Mat. & Min. Sci. | NO | attend MSM lecture; start PoO practical later |

It is unknown about timetable clashes for Education Studies students and it is proposed that these are considered on a case-by-case basis.

4.4 Lecture/practical clashes - avoidable

Practical sessions which start in the morning obviously provide additional constraints on when students can be allocated. Pointers on where these clashes occur are given below.

| Subject 1 (practical) | Subject 2 (lecture) | Notes |
|-----------------------|---------------------|---|
| Chemistry | Biology of Cells | prefer Chemistry practical on M.W.F. – but see above for permitted clash |
| Chemistry | Geology | Chemistry practical on Tu.Th. only |
| Chemistry | Mat. & Min. Sci. | Chemistry practical on Tu.Th. only |
| Chemistry | Ev. & Beh. | Chemistry practical on W.F. preferably: M. if necessary |
| Chemistry | Phys. of Org. | Chemistry practical on M. preferably: W.F. if necessary |
| Ev. & Beh. | Phys. of Org. | E&B practical on M only |
| Geology | majority | arrange practical set combinations as follows: F.M.W.9 – clashes with EMB and Physics lectures F.M.W.10 – clashes with Biology of Cells lectures F.M.W.12 – clashes with MMS lectures Th.Sa.Tu.10 – clashes with Chemistry lectures |
| Mat. & Min. Sci. | Maths. Computing | ensure that, overall, either Tu.12-1 or Th.12-1 is kept free |
| Mat. & Min. Sci. | Ev. & Beh. | potential clashes but usually enough flexibility to not be a problem |
| Mat. & Min. Sci. | Phys. of Org. | |
| Mat. & Min. Sci. | Chemistry | |
| Mat. & Min. Sci. | Geology | |

5 Registration timetable

The actual process of registration should proceed as follows:

| | | |
|----|----------|--|
| | | Students arrive in Cambridge |
| M | Day -3 | All students should communicate to DoSs their confirmed subject choices: by 18:00 – DoSs enter data for students into system via Web System administrator to have added all “hardwired” choices |
| Tu | Day -2 | by 12: 00 – Students informed by email individually of timetable, to allow for supervision planning System to generate and send lists of students (by practical session) to individual subjects/Departments |
| W | Day -1 | Students attend subject sessions, including study skills sessions |
| Th | Day 0 | Lectures and practical sessions start |
| | Day -1 → | Students may negotiate with individual subjects about moving their sessions (not through the above system) |

N.B. For 2005, Day 1 is Thursday 6 October