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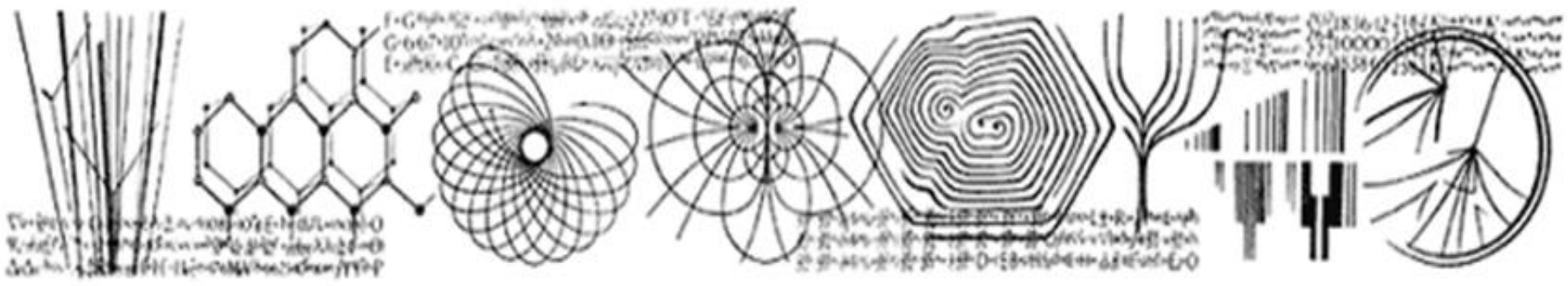
Department of Physics

CHOOSING ELECTIVES FOR YEARS 3 & 4

Years 3 & 4 of the Physics Programme



13th May 2024

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Points of contact and upcoming events

Contacts

Deputy Head of Department

- Carlo Contaldi

Head of Years 3 & 4

- Yvonne Unruh (ph.hoy3-4@imperial.ac.uk)

Head of 3rd Year Lab

- James McGinty

3rd-year Project Coordinator

- Paul French

Events

Electives Fair: 15th May, 11am-1pm, Foyer

Electives Soundbites (released on Panopto after Electives Fair)

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Years 3 and 4 of the Physics Programmes

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Choosing your elective modules

Lots of choice to suit your academic interests. However, you need to consider the following in making your choice:

- Constraints from your degree programme specification.
  - Number of ECTS, Required module,
  - Required theoretical electives (BScT & MSciT).
- Pre-requisite/co-requisite (see module specifications).
- Workload balance between terms
- Timetable clashes?
- Horizons/Business?
- External options?
- Your academic performance/interest.

… play to your strengths

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Degree Requirement – Year 3

- Students must pass **all modules** to graduate or progress.
- **Core and/or Compulsory Modules – 32.5 ECTS**
  - Nuclear & Particle Physics (Core: 5 ECTS)
  - Solid State Physics (Core: 5 ECTS)
  - Comprehensives (Core: 15 ECTS)
  - Laboratory (BSc or MSci, Compulsory: 7.5 ECTS)
  - Advanced Classical Physics (BScT or MSciT, Core: 7.5 ECTS)
  - Project (experimental, theoretical or essay) (BSc, or BScT, Compulsory 7.5 ECTS)
- **Electives (options) – 27.5 to 30 ECTS**
  - BScT must have minimum of 15ECTS theory elective modules.
  - MSci, MSciT – 1 elective **may** be a project
  - MSciT – must have minimum of 7.5 ECTS theory electives.
  - Up to 7.5 ECTS can be at FHEQ 7 level (normally need 60% at end of Y2).
  - Up to 7.5 ECTS can be an elective from a department other than Physics (subject to space being available and agreement of both DUGS, delegated to HoY in Physics)
- **Total ECTS in Year 3 = 60-62.5 ECTS**

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Degree Requirement – Year 4 MSci & MSciT

- Must pass **all modules** to graduate.
- Must have minimum 30 ECTS electives at FHEQ7 level over Y3/4.
- **Core and/or Compulsory Modules – 30 ECTS**
  - MSci project (Core: 25 ECTS)
  - Research Interfaces (Core: 5 ECTS)
- **Electives (options) – 30 to 32.5 ECTS**
  - May have one module at FHEQ6 only if having done a FHEQ7 module in Y3.
  - MSciT – must have 37.5ECTS theory electives over Y3&4.
  - Up to 7.5 ECTS can be an elective from a department other than Physics (subject to space being available and agreement of both DUGS, delegated to HoY in Physics)
- **Total ECTS in Year 4: 60 - 62.5 ECTS**

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Degree Requirement – Year 4 MSciYA

- Must pass **all modules** to graduate.
- Must have 60 ECTS at FHEQ7 level over Y3/4.
- **Core and/or Compulsory Modules – 32.5 ECTS**
  - Comprehensives (Core: 15 ECTS)
  - Solid State Physics (Core: 5 ECTS)
  - Nuclear & Particle Physics (Core: 5 ECTS) **
    - ❖ "Exceptionally, for Nuclear and Particle Physics and Solid State Physics, where an equivalent module is available in your year abroad that meets the same learning outcomes of one of these modules, you may be permitted to take that module instead."
  - Physics Laboratory 3 (Compulsory: 7.5 ECTS) **
    - ❖ Exceptionally, may be replaced with electives **if** doing ≥20ECTS theory electives
- **Electives (options) – 27.5 to 30 ECTS**
  - Must have minimum 60ECTS FHEQ7 modules in degree.
  - Up to 7.5 ECTS can be elective from a department other than Physics (subject to space available and agreement of both DUGS, delegated to HoY in Physics)
- **Total ECTS in Year 4: 60 to 62.5 ECTS** …. ** see also here

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Which degree programme?

Thinking of changing to the BSc, BScT↔MSci, MSciT?

- Do you satisfy programme requirement in Y2?
- Is BSc+MSc better fit for you compared to MSci?

  … if interested: info about MSc at Imperial
- discuss first with personal tutor
- contact Senior Tutor to change
- Change to MSci degree for student visa holder require ATAS

Most students should wait for exam results in the summer and then request the change.

Start Year 3 on degree in which you intend to graduate

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Elective selection process 2024

- Electives soundbite. Will be on Panopto.
- Electives Fair: 11:00-13:00 Wednesday 15th May (Blackett Foyer)
- Use online app to choose your elective modules. **App will open Monday 20th May and close at 17:00 17th June.**
- Important to review Programme/Module Specifications.
- Some modules are limited in capacity.
- All students must select a minimum of 10 modules.
- Allocation of elective modules by random process (no need to rush).

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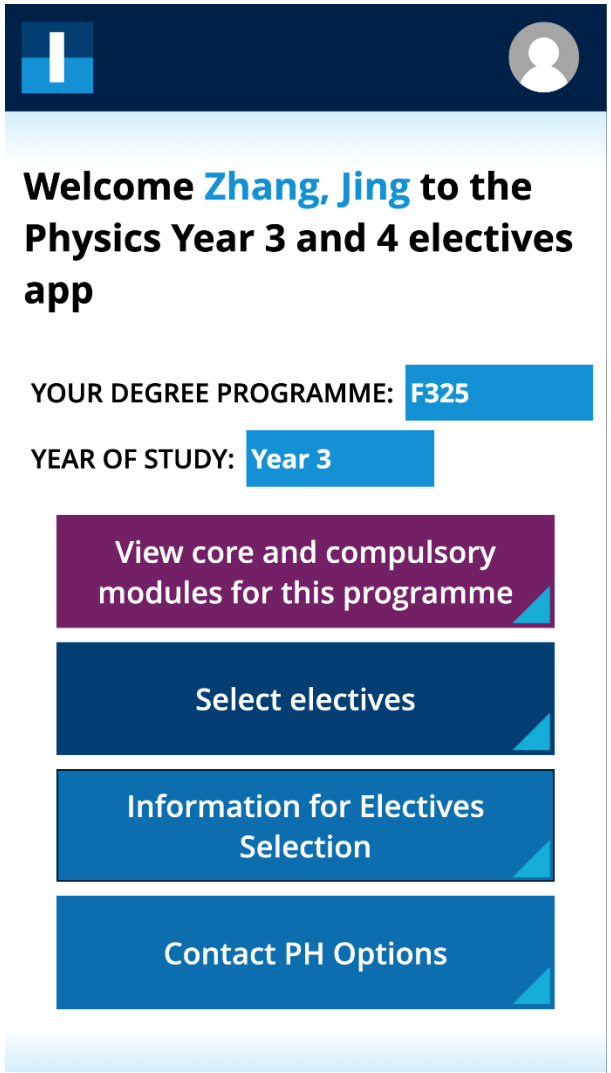
The App



- *Based on Microsoft PowerApp & Sharepoint*
- *Designed to work with mobile phone and Desk/laptop browser.*
- *Use this app to submit your preferred choice.*

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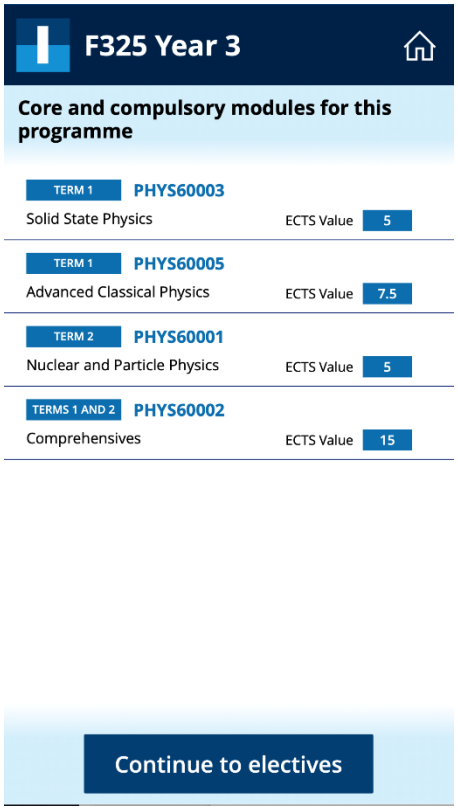
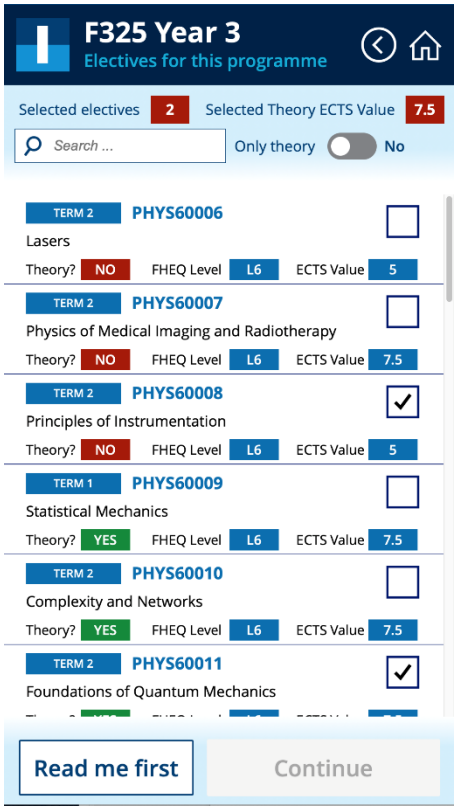
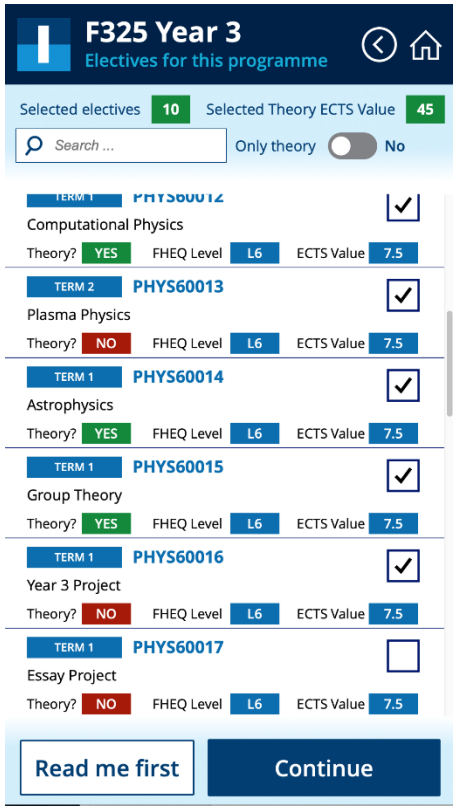
The App







Choose elective modules

When minimum is reached, can continue.

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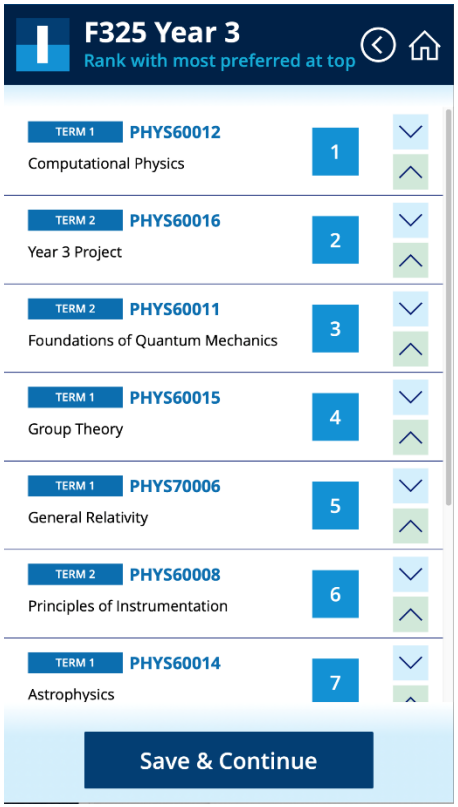
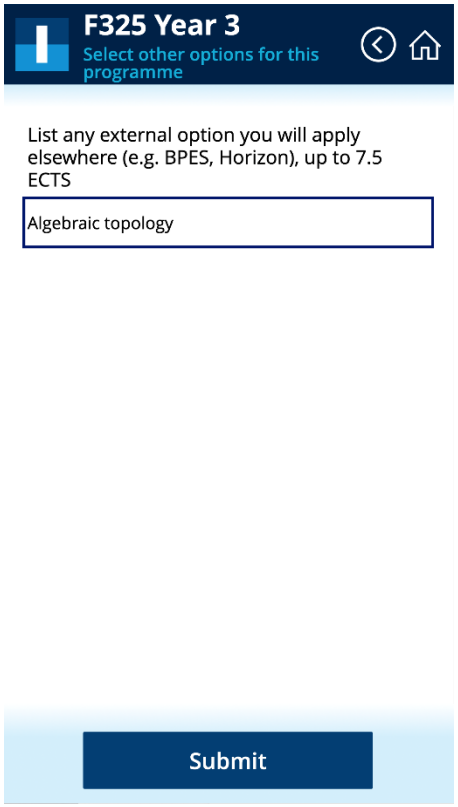
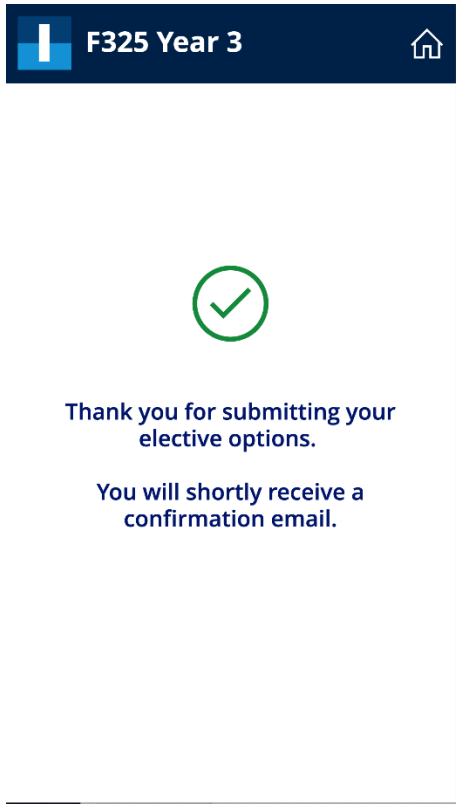


Rank your choices. See guidance from DUGS.



List any non-standard elective you may consider.



Check your email for summary of preferences.

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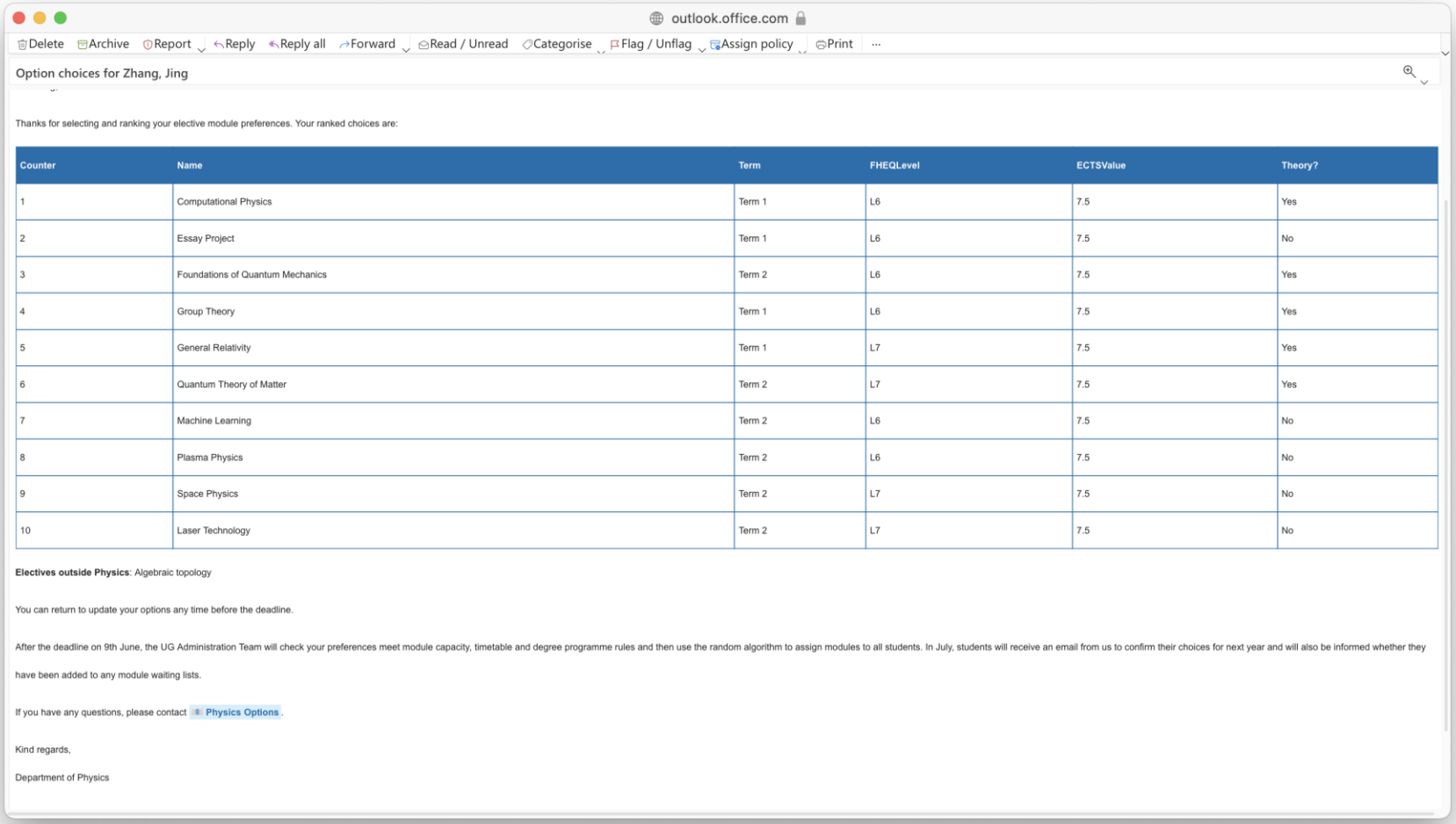
The App



If you made a mistake, simply go back and do it again.

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Choosing your electives

- MSci students should consider Years 3 and 4 together
  - Only select options for 2023-24 academic year now
- Year Abroad students (currently in Y2) should consider, but not select Year 4 options.
  - May be influenced by choice of courses abroad. Choose May next year.

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FHEQ Level 6 and 7 electives

- The level indicates the target year for that course
- FHEQ 7 is Masters level

  courses are significantly more advanced than FHEQ 6 courses
- FHEQ 6 modules have a pass mark of 40%
- FHEQ 7 modules have a pass mark of 50%

  (consistency between MSci and MSc courses)

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How many electives at each level ?

- BSc or BSc with Theory
  - Total of 20 – 22.5 ECTS electives (excluding Y3 lab/ACP & projects)
  - BScT must have minimum of 15 ECTS theory electives.
  - Up to 7.5 ECTS at FHEQ 7
    - not recommended if average < 60%
- MSci or MSci with Theory
  - Year 3
    - Total 27.5 – 30 ECTS of electives (may replace an elective with a BSc project or Essay project (FHEQ 6))
    - F390 need minimum of 7.5ECTS Theory electives.
    - Up to 7.5 ECTS at FHEQ 7
  - Year 4
    - Degree must include at least 60 ECTS at Masters level (7)
    - Year 4 Project + Research Interfaces = 30 ECTS
    - Need at least 30 ECTS of Electives at FHEQ 7 *during degree.*

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Short electives

- **FHEQ 6**
  - Lasers (5 ECTS)
- **FHEQ 7**
  - Optical Communications (5 ECTS)
  - Information Theory (5 ECTS)
  - Hydrodynamics (5 ECTS)

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Non-standard elective

- You may be allowed to choose non-standard elective in another department.
  - Needs approval of Director of Undergraduate Studies of external Department **and** Physics
  - Discuss with your PT, then contact HoY once you have some idea on what you may wish to explore
  - Previous permissions granted for modules in Maths, Computing, Bio-Engineering, Geophysics
- HORIZON/BPES and EfP are considered non-standard electives (no special approval required)

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Horizons, Business & Language modules

- You may choose one Horizons or BPES module.
  - **Horizons** modules (5 or 7.5 ECTS) online registration
    - Register 10th May – 12th June at https://www.imperial.ac.uk/horizons/enrolment/
    - Final year students may only do a language option if it is a higher level course in the same language as done in a previous year.
  - Year 4 YA students may do a course in the language (eg French) of the country in which they did Year 3.
    - Must be at least 2 levels above that done previously.
  - **Business** modules (5 ECTS) – Register 16th May- 30th May https://www.imperial.ac.uk/business-school/programmes/undergraduate-study/bpes-modules/

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Standard or Theoretical Elective Modules ?

Some modules are more theoretical than others

- More mathematically demanding
- Don't overload on these
- Senior Tutor will review the number you have chosen after Year 2 exam results
- Theory degrees require you to take a minimum number of theory options:
  - » MSci – 37.5 ECTS over Years 3 and 4
  - » BSc – 15 ECTS

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Constraints

Timetable & Exams:

Most of our modules are paired (see document)

- Lectures, are scheduled to occur simultaneously
- Exams are very likely to happen at the same time
- Most pairs are between FHEQ 6 + FHEQ 7 modules

  … MSci students could do 1 in each year.
- Try to balance your work between Terms 1 & 2.

Module Capacity: some are capped in numbers.

EfP 30; PI 27; CP 110; DSci 80; (Yr3 Projects if on MSci)

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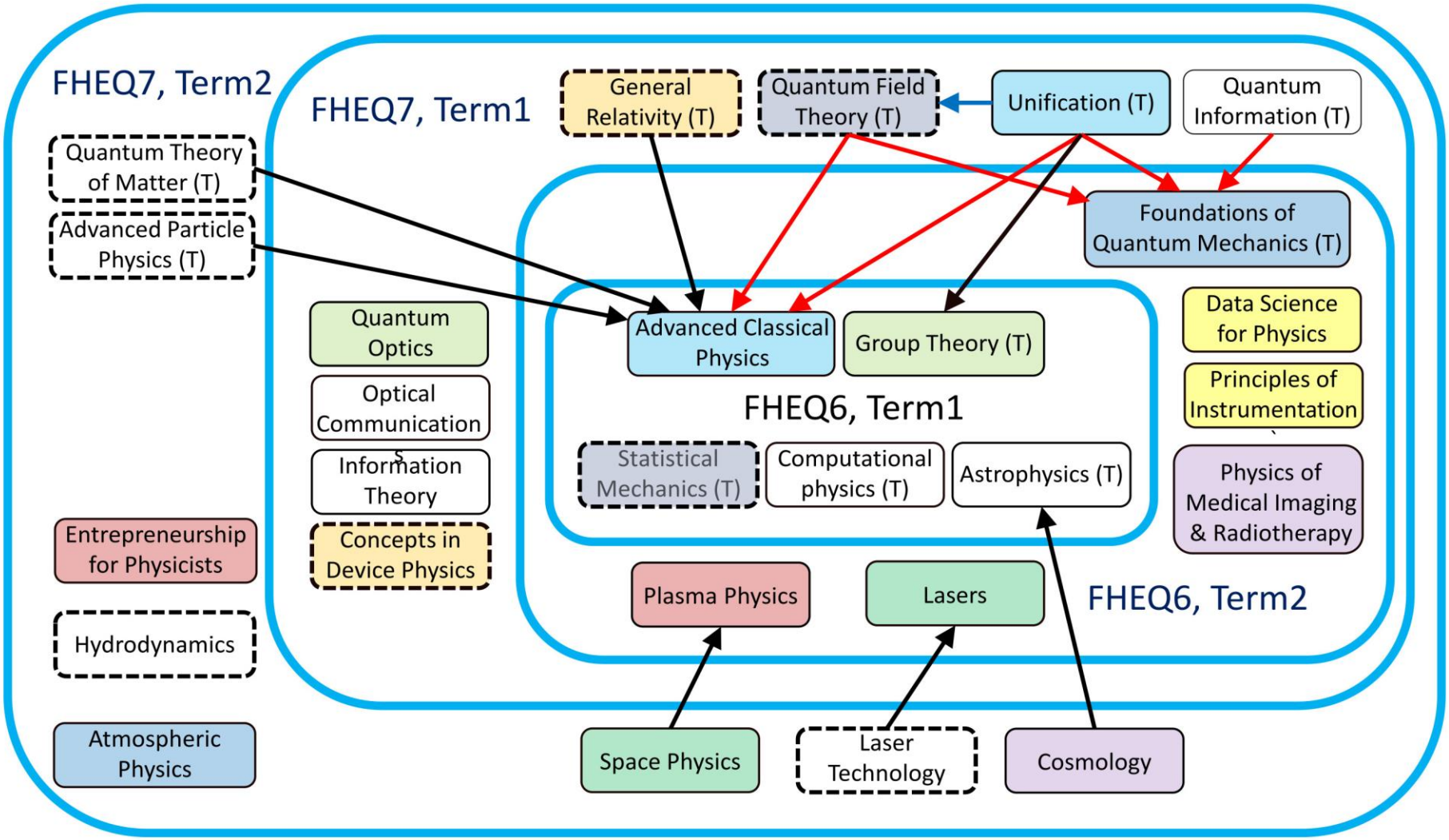
Constraints

- Very few of our electives have formal pre-requisites, co-requisite.
  - Pre-requisite: must have taken pre-requisite before taking the module.
  - Co-requisite: must take co-requisite at the same time.
  - Recommended prior knowledge: benefit from having taken the indicated module before.
  - e.g. Unification requires ACP, FQM before (pre-requisite) and taking QFT at the same time (co-requisite).
- Module Overview – here you can see how the FHEQ 6 and 7 modules fit together.

FHEQ6 and 7 Elective Modules Overview 2024/25



Prerequisite; Corequisite; recommended prior knowledge.

Y3 Core: Solid State Physics - Term 1, Nuclear and Particle Physics – Term 2.
Y3 projects and lab are offered in Term1 and Term 2.
Horizons and BPES options are at FHEQ 6 level, Term 1 or 2.
Capped Modules: EfP 30; PI 27; CP 110; DSML 80; Y3 lab & project ~90/term;

Same cell colour: Lectures of the same term share the same time slot.

: Lectures are timetabled at the same time as Y3 lab in the term.

Electives are worth 7.5 ECTS except for: Lasers, Hydrodynamics, Information Theory and Optical Communication, which are each worth 5 ECTS.

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Think about

- What you like and are good at
- What you want to do in 4th Year (MSci and YA)
- What you want to do after your degree
- The balance of work through the year

You may revise choices after current exam results

discuss with Personal Tutor as soon as possible agree changes with Derryck Stewart or Victor Urubusi.

Bottom line: You can't drop an elective module once assessment was submitted. Electives are set in stone at end of Wk5 in the term delivered.

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Ranking consideration

- Produce two ranked list of modules, one for capped modules, one for uncapped modules.
- Check against rules & constraints.
- Consider the allocation process and your chances based on cap, your year & degree programme.
  - ➢Assign Core modules first
  - ➢Allocate compulsory/priority according to degree/year.
  - ➢Random process across all Y3/Y4 students.
- Place capped elective modules you wish to do for sure first.
- Rank others as according to your preference and work load consideration etc.

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Online information…

Module specifications for 2024-25 electives:

https://www.imperial.ac.uk/physics/students/current-students/undergraduates/degree-programmes-modules-and-timetables/undergraduate-electives/

Horizons / Language course information:
https://www.imperial.ac.uk/horizons/

Business School course information:
https://www.imperial.ac.uk/business-school/programmes/undergraduate-study/bpes-modules/

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Electives Fair

- Come to the Electives Fair
  - Wednesday 15th May, 11:00–13:00
  - In person event at Blackett foyer.
- Next week
  - Discuss with your personal tutor by email, in person or over TEAMS.
- HoY Office Hour (Blackett 1114):

  Mon 12 – 1pm, until 12th June
- Electives App closes at 17:00 17th June.

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Third Year Lab & Projects

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Third Year Lab & Projects

- Head of Lab, ***Dr. James McGinty***
- Head of Projects, ***Prof Paul French***
  - What is 3rd year lab all about ?
  - Who has to do what ?
  - Short Experiments and Long Projects.
  - Where to find more information.

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What is 3rd year lab for ?

… designed to teach you how to work on difficult experimental and data analysis problems with significantly less guidance than previous labs

… can be a painful, but is often very rewarding experience

… key stepping stone: independent project work, ability to create professional presentations, reports and papers

- *Use your own initiative, most experiments have extension elements.*
- *Find out about the problem using text books, web and other resources.*
- *Remember what you have learnt in year 1 & 2. Make use of your skills.*
- *Lab work done in pairs; reports assessed separately.*
- *Demonstrators are there to assist, 'challenge', and assess (don't expect the same level of instruction as year 2).*
- *Laboratory staff are there to help on equipment issues.*

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What Lab Options Must You Take ? BSc Students

- **BSc Physics**,
  - ⇒ 1 term of lab (7.5 ECTS), in either Term 1 ***or*** Term 2.
  - ⇒ 1 term practical (7.5 ECTS) or essay project (7.5 ECTS) – in complementary term to lab.

- **BSc Theory Students**,
  - ⇒ No lab, take ACP as core.
  - ⇒ 1 term theory project organised through 3rd year lab.
  - ⇒ May replace the theory project with an essay project.

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What Lab Options Must You Take ? MSci Students

- **MSci (Year 3)**
  - ⇒ 1 term of lab (7.5 ECTS), in either Term 1 ***or*** Term 2.
  - ⇒ May replace 1 elective with a practical or essay project, in complementary term to lab

- **MSci Year Abroad (Year 4)**,
  - ⇒ 1 term of lab (7.5 ECTS), in either Term 1 ***or*** Term 2.
  - ⇒ No project (done at host university in Year 3).
  - ⇒ Students who do 3 or more theory elective may replace lab by another elective subject to the approval of course director.

- **MSci Physics with Theoretical Physics (Year 3)**
  - ⇒ No lab in Year 3, take ACP as core.
  - ⇒ May replace 1 elective with a group project.

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Lab structure and options

- Third year lab is comprised of 3 experiments (or cycles). There is also the option to take 1 experiment and the Microprocessors course.
- There are ~13 experiments covering a broad range of physics. These are reviewed every Summer, so there may be changes/upgrades from previous years.
- The short course on microprocessors available in both terms. Equivalent of 2 experiments/cycles.

Fourier Analysis
Solar Radiation
Radiation Laws
Laser Spectroscopy
Astro Image Processing
Waveguides
Micromagnetics
X-ray Diffraction
Wind Turbulence
Compton Scattering
Photoelectric Effect
Microprocessors
LEDs and Diodes

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Lab structure and options

- Third year lab is done in pairs. Agree a lab partner now – both must pick lab in the same term!
- We will set up an online system for those without lab partners.
- Submit a ranked list of all experiments as a lab pair.
- Optimisation algorithm is used to allocate experiments.
- You will be emailed soon about these processes.

Fourier Analysis
Solar Radiation
Radiation Laws
Laser Spectroscopy
Astro Image Processing
Waveguides
Micromagnetics
X-ray Diffraction
Wind Turbulence
Compton Scattering
Photoelectric Effect
Microprocessors
LEDs and Diodes

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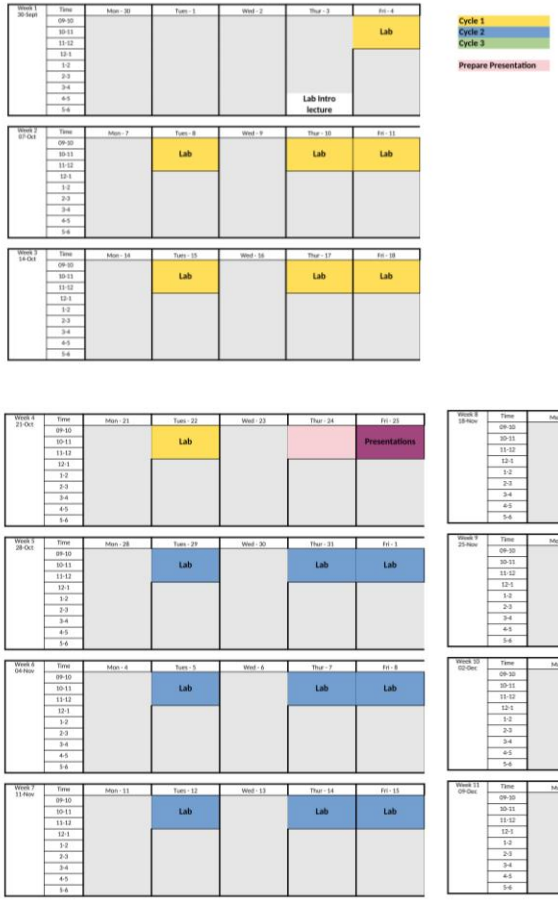
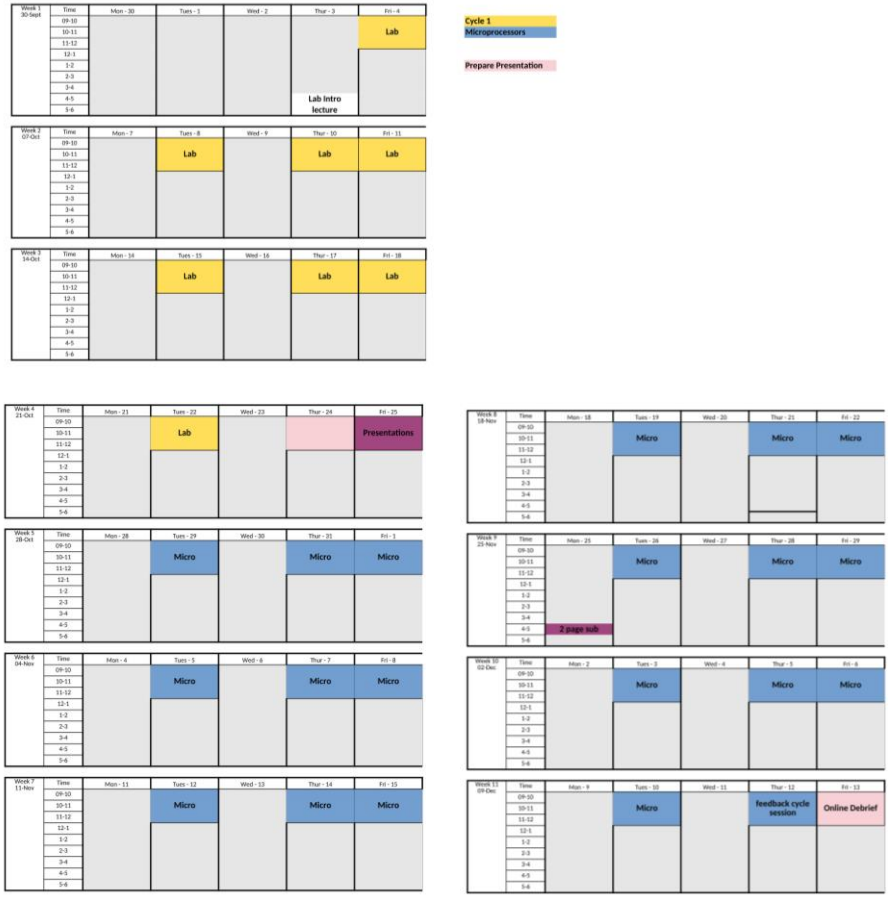
Example timetable and cycle structure

3 experiments



1 experiment and Microprocessors



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3rd Year Projects

A chance to find out what real research is like

Head of Projects –
Prof. Paul French

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Who has to do a 3rd Year Project?

- Compulsory for all BSc students
  - Practical & Theoretical - work in pairs
  - Essay – work alone
  - New! Work in larger groups.
- MSci & MSci theory may do a Group Project in Y3
  - Priority is given to BSc students for projects

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Types of Project Available

- Projects based in 3rd year lab
- Projects in the research groups
  - Experimental
  - Computational
  - Theoretical (priority given to BSc Theory students).
  - Essay
- Projects proposed by students

Think hard about the type of project you choose with your **career** in mind

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What the Essay Projects are

- Available for all students (except YA) in Year 3
- An individual literature-based research project under the supervision of a member of staff.
- Allows a student to switch between MSci & BSc up to 31st March in Year 3.
- Assessed on the Essay itself and a viva (as with BSc projects)
- Amount of work and standard expected from the student as for a BSc project
- Not an easy option.

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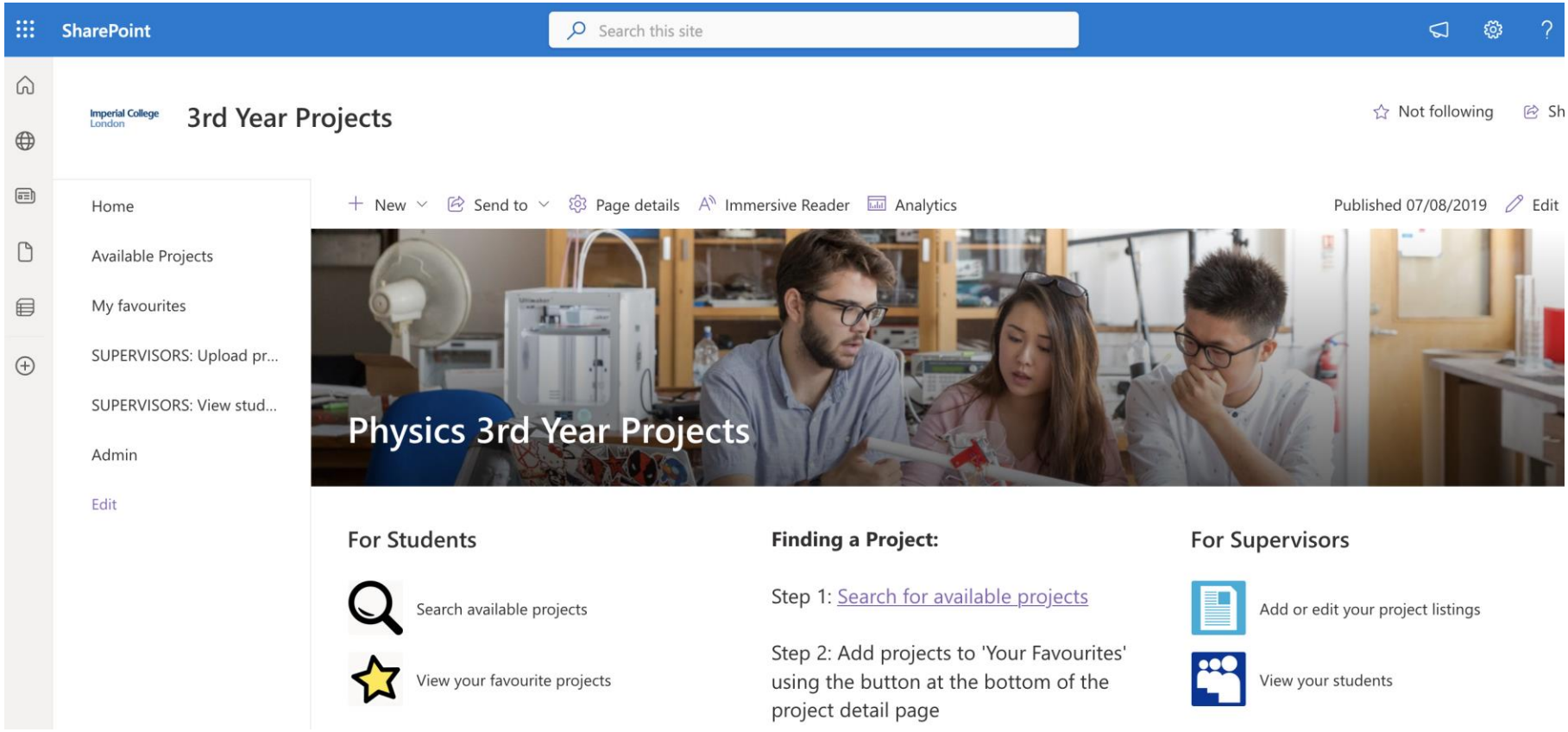
Getting more information.



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Getting more information.

- The Project SharePoint site will be opened during the summer.
- Start looking for projects over the summer. We will advertise when the site has rolled over.
- Find a partner now!
- Don’t contact supervisors until I know they are ready for you! (September for Term 1, Xmas break for Term 2).