



STUDENT COURSE PLANNING

FOR 2003

Contents

| | |
|---|---|
| Introduction | 2 |
| Entrance Criteria for Advanced Physics Subjects | 2 |
| Physics major and entry to Physics Honours | 3 |
| Second Year Physics Subjects | 4 |
| Third Year Physics Subjects | 6 |
| Combined Courses | 8 |

Web site: <http://optics.ph.unimelb.edu.au/courseplan.html>

Circulation

Physics
Mathematics & Statistics
Biochemistry & Molecular Biology
Environmental Science
History & Philosophy of Science
Information Systems
Optometry & Vision Science
Computer Science
Chemistry
Earth Sciences
Electrical Engineering
Mechanical and Manufacturing Engineering
Civil & Environmental Engineering
Faculty of Science
Faculty of Engineering
Faculty of Law
Faculty of Arts
Faculty of Economics and Commerce
Faculty of Medicine, Dentistry & Health Sciences

SCHOOL OF PHYSICS STUDENT COURSE PLANNING FOR 2003

(AUGUST 2002)

Introduction

To gain a B.Sc. degree, a student must obtain a credit of at least 300 points, with 75-125 at 100 level and at least 50 (preferably 90 or more) at 300 level. The corresponding information for Combined Course students is given in the relevant section.

Enrolment

Enrolment for 2001 is being done by students themselves via the Internet. Further details are contained in a letter sent to students by the Faculty of Science. Students enter own course via Web, October 4 – 18: <http://www.sis.unimelb.edu.au/>
Information from Science Faculty: <http://www.science.unimelb.edu.au/courses/planning.html>
Handbook: <http://www.unimelb.edu.au/HB/> <http://www.science.unimelb.edu.au/hbupdates/>
Timetable: <http://sis.unimelb.edu.au/cgi-bin/subjects.pl>
Students need to establish an ITS e-mail account prior to entering their course for the coming year. October 18 is the closing date for Round 1 of quota selection.

Maximum workloads

Please note the Faculty of Science rules governing overloads. Students who have successfully completed 62.5 points at 100-level can enrol in up to 56.25 points per semester. Students who have not failed any subjects in the previous semester are permitted to enrol in 62.5 points per Semester. Although strong students are encouraged to enrol in a wide range of subjects, they should not do so many subjects that their overall performance is affected.

Guidelines for Entry to Advanced Physics Subjects

Core physics lecture units are given at both the **advanced and standard level** at both 200 and 300 level. Both streams can lead to a major in Physics and to Physics Honours. The pace of advanced courses is faster, the material is covered in more depth and assumes a stronger mathematical background. The grade a student receives in a course should not depend on whether it is taken at the standard or advanced level. To ensure that students undertake the appropriate level subject, the School of Physics has developed the following guidelines for entrance to advanced level physics subjects at 200 and 300 level. If a student wishes to enrol in a 220 or 320 series subject and is close to meeting, but doesn't quite satisfy, these criteria he or she should consult the year organiser.

Entrance to 2xx Series Subjects

| | |
|--|----|
| Average Physics 121/141 or 122/142 mark | 70 |
| Average mark in Maths. [111/121/141, 112/122/142, 113/123/143] | 70 |

Entrance to 3xx Series Subjects

| | |
|--|----|
| Average second year Physics Theory mark (excluding 251) | 70 |
| Average second year Mathematics mark [231, 232, 221/222/252] | 70 |

Honours (4th year) entry

Various majors and co-majors involving physics are outlined below. Note, however, that completion of a physics major does *not necessarily* permit a student to enrol in Physics Honours (4th year). In order to enrol in Honours (which is required to pursue a higher degree in physics and is desirable for those wishing to pursue a career in industrial physics) students are required to complete:

- 640-321/341 Quantum Mechanics
- 640-322/342 Thermal Physics
- 640-323/343 Electrodynamics
- 640-353 Atomic, Molecular and Solid State Physics
- 640-299 Laboratory work
- plus
- *Either* 25 points of 300-level physics laboratory work *or* 50 points of mathematics chosen from 620-311, 620-312, 620-321, 620-322, 620-331, 620-332, 620-341, 620-342 [which in turn requires completion of additional 2nd year maths pre-requisites] *or* [12.5 points of 300-level physics laboratory work *AND* 25 points of mathematics chosen from 620-311, 620-312, 620-321, 620-322, 620-331, 620-332, 620-341, 620-342]

Students wishing to retain the option of enrolling in Physics Honours in future years should ensure that they complete the required 300-level subjects and their pre-requisites.

Physics Major: Physics Specialisation

100-level subjects

- 640-121/141 and 640-122/142 Physics A and B
- 620-111/121/141 and 620-112/122/142/200/211 Mathematics A and B/2
- 620-113/123/143 Applied Mathematics

200-level subjects

- 640-223/243 Quantum Mechanics & Thermal Physics
- 640-225/245 Electromagnetism & Relativity
- 640-299 Laboratory Work
- At least one of 640-237 Astro & Optics II, 640-234 Further Class & Quantum Mech *or* 640-251 Inst. for Scientists

300-level subjects

- 640-321/341 Quantum Mechanics
- 640-364 Computational Physics *or* 12.5 points of 300-level Physics laboratory work
- 25 points or more of other 300-level Physics subjects.

The Physics Major: Physics Specialisation is accredited by the Australian Institute of Physics.

Physics Major: Mathematical Physics Specialisation

100-level subjects

- 640-121/141 and 640-122/142 Physics A and B
- 620-111/121/141 and 620-112/122/142/200/211 Mathematics A and B/2
- 620-113/123/143 Applied Mathematics

200-level subjects

- 640-223/243 Quantum Mechanics & Thermal Physics
- 640-225/245 Electromagnetism & Relativity
- 620-231 Vector Analysis
- 620-232 Mathematical Methods

300-level subjects

- 640-321/341 Quantum Mechanics
- 640-322/342 Thermal Physics
- 620-331 Applied Partial Differential Equations
- 640-332 Integral Transforms & Asymptotics *or* 620-341 Dynamical Systems & Chaos

The Physics Major: Mathematical Physics Specialisation requires additional second and third year subjects to proceed to honours entry in physics.

200-level physics subjects

| Sem | Code | Subject | Pts | Pre- and co-requisites | Pre-requisite for |
|-----|---------|--|------|---|--|
| 1 | 640-223 | Quantum Mechanics and Thermal Physics (Advanced) | 12.5 | Physics 121/141+122/142 Maths 111/121/141/140 + 112/122/142/211 + 113/123/143/ +231* | 321/341 Quantum Mechanics 322/342 Thermal Physics |
| 1 | 640-243 | Quantum Mechanics and Thermal Physics | 12.5 | Physics 121/141+122/142 Maths 111/121/141/140 + 113/123/143* + 112/122/142/211* | 321/341 Quantum Mechanics 322/342 Thermal Physics |
| 1 | 640-237 | Astrophysics and Optics II | 12.5 | Physics 121/141+122/142 Maths 111/121/141/140 | 351 Astrophysics and Optics |
| 1 | 640-251 | Instrumentation for Scientists | 12.5 | Physics 121/141/151/161 +122/142/152/162 Maths 111/121/141/151/(161+162)/140 | |
| 1 | 640-261 | Energy and the Environment | 12.5 | | |
| 2 | 640-225 | Electromagnetism and Relativity (Advanced) | 12.5 | Physics 121/141+122/142 Maths 231 + 113/123/143 | 323/343 Electrodynamics |
| 2 | 640-245 | Electromagnetism and Relativity | 12.5 | Physics 121/141+122/142 Maths 231* + 113/123/143 | 323/343 Electrodynamics |
| 2 | 640-234 | Further classical and quantum mechanics | 12.5 | Physics 223/243 Maths 231* | |
| 2 | 640-299 | Laboratory work | 12.5 | Physics 121/141+122/142 | 391,392,393,394 Laboratory |

Notes

- Subjects marked * are pre-requisites or co-requisites; others are pre-requisites.
- Students who have completed Maths A (620-111/121/141) and Applied Maths (620-113/123/143) may also enrol in Quantum Mechanics and Thermal Physics with Maths B (620-142) as a co-requisite.
- In addition to meeting formal prerequisite requirements, students should note the following:
 - A knowledge of the material covered in Instrumentation for Scientists and/or the optics covered in the 237 lecture course will be advantageous when undertaking the Laboratory unit 640-299.
 - It will be assumed that students are taking Maths 232 concurrently with 225/245 Electromagnetism.
 - Students intending to take Honours Physics (4th Year) must take the Laboratory subject 640-299 or equivalent.
 - Students who have taken half of a 2000 12.5 point subject in previous years and need to complete the other half to satisfy prerequisites will need to take special 6.25 unit subjects. These students should consult the Course Planning co-ordinator.
 - Note that students who completed 100-level maths units prior to 1999, should ensure that they have completed the equivalent mathematics units.

Core units

The core units are:

- 640-223/243 Quantum Mechanics and Thermal Physics (Semester 1)
- 640-225/245 Electromagnetism and Special Relativity (Semester 2)
- 299 Laboratory Work.

Course plans

Suggested course plans for B.Sc. students are given on the following page.

Mathematics

Careful attention must also be paid to the sequence of Mathematics subjects required in second year; this will depend on what Mathematics subjects a student completes in first year, as indicated in the table. Mathematics 231 and 232 are prerequisite for many 300 level Physics subjects and Mathematics 231 is a pre- or co-requisite for the 200 level Physics subjects: 223 and 225/245. Students wishing to pursue a major in 300 level Physics must, by the end of second year, have passed the following Mathematics subjects: 111 or 121 or 142[98] or 141[99+], 112 or 122 or 142[99+] or 211 or 200[98-], 113 or 123 or 143 or 130[98-] or 132[98-], 231 and 232. Students undertaking engineering mathematics subjects should consult the section on Combined Courses at the end of this document.

300-level physics subjects

| Sem. | Code | Subject | Pts | Pre- or co-requisites |
|------|-------------|---|------|--|
| 1 | 640-321/341 | Quantum Mechanics | 12.5 | Physics 223/243 Maths 231+232 |
| 1 | 640-322/342 | Thermal Physics | 12.5 | Physics 226/246[98-] or 223/243[99+] |
| 1 | 640-351 | Astrophysics and Optics | 12.5 | Physics 227/247[98-] or 237[99+] Maths 231+232 |
| 1 | 640-356 | Theoretical Methods for Physics | 12.5 | 37.5 pts of 200-level physics including 223/243 and 225/245 Physics 321/341*+322/342* Maths 231+232 |
| 1 | 640-393 | Laboratory work | 12.5 | Physics 299 |
| 2 | 640-323/343 | Electrodynamics | 12.5 | Physics 225/245 Maths 231+232 |
| 2 | 640-353 | Atomic, Molecular and Solid State Physics | 12.5 | Physics 321/341 |
| 2 | 640-354 | Nuclear and Particle Physics | 12.5 | Physics 221/241[98-] or 225/245 [99] or 223/243 [2002+] |
| 2 | 640-364 | Computational physics | 12.5 | Physics 321/341 Maths 231/232 |
| 2 | 640-394 | Laboratory work | 12.5 | Physics 299 |

* Those pre-requisites marked with an asterisk may be taken as either a pre- or co-requisite

Seminar: Students enrolled in 50 pts of 300 Physics must enrol in 310 Seminar. Others may enrol.

Laboratory work: The standard combination of laboratory work is 393 in Semester 1 followed by 394 in Semester 2.

Physics IV (Honours Year)

- Prerequisites for entry to 4th year are given earlier.
- To enter 4th year, students normally require at least an average of 65% in their best 87.5 points of 300-level Science units. Combined course students have their Faculty score based on a weighted average mark. This score counts 1/3 and the honours year mark 2/3 of the score for award of postgraduate research scholarships. Students, therefore, should not undertake a workload that will cause 300-level results to suffer.
- The choice of 3rd year subjects in no way influences or prejudices a student's admission to a particular research group unless they are doing the bare minimum Mathematical Physics major or, the co-major with Environmental Science.

Mathematics Combinations

- Note that the Mathematical Physics major (no longer offered) does not necessarily permit entry to Physics Honours. It may, however, be obtained in conjunction with a Physics major or permit entry to Physics Honours by completing the required extra Physics subjects.
- Some students may be interested in a major in both Physics and Mathematics. This is different from a Mathematical Physics major. They should see the description of a Physics major above and consult the Mathematics and Statistics department about requirements for a Mathematics major. Note that this combination also does not necessarily permit entry to Physics Honours.
- Students who satisfy the requirements to both Physics and Mathematics Honours may also be admitted to a combined Mathematics and Physics Honours course.

Suggested course plans are given on the next page

Combined Courses

Students in **B.Sc./B.E.**, **B.E./B.Sc.** and **B.A./B.Sc.** must acquire credits of at least 237.5 Science points (i.e. points for subjects listed in the Science section of the Undergraduate Studies Handbook), including at least 75 points at 100 level subjects and at least 50 points at 300 level.

Students in **B.Sc./LL.B.** must acquire credits of at least 200 Science points including at least 50 points of 100 level subjects and at least 50 points at 300 level.

The attention of students is drawn to the requirements for a Physics major for all courses commencing 1999 or later, and to the requirements for admission to Physics Honours, listed above.

In combined courses, so many different choices of subjects are possible that it can become very difficult to avoid timetable clashes. For B.Sc./B.E.(Electrical stream), there are few if any timetable problems, thanks to co-operation between Science and Engineering departments in Year 2 and Year 3 subjects; Years 4 and 5 present no problems because they are either pure Science or pure Engineering. The timetabling situation for other combined courses, however, still raises problems, and is under review, the aim being to avoid serious clashes at least between named subjects in the following suggested courses.

Combined Science/Engineering students should note that the School of Physics & the Faculty of Engineering prefer that they take the B.Sc. Mathematics units, in particular 620-231 and 232. Students, however, may take the appropriate Engineering Maths units and still satisfy the pre-requisites for 200- and 300-level Physics. The subjects

- 431-201/204 Engineering Analysis A [98+]
- 431-205 Engineering Analysis B [98+]

satisfy the mathematical pre- and co-requisites for all 640-200 and 300-level subjects. Students who have completed Engineering Mathematics units in prior to 1998 should note that the sequence

- 431-203 or 431-204 Mathematics for Engineers 2.1A or 2.1B
- 431-205 Mathematics for Engineers 2.2
- 431-303 Mathematics for Engineers 3.1

satisfies the mathematical pre-requisites 200- and 300-level Physics.

Students who take Engineering Maths should note that these subjects *do not* contribute toward Science points and they may need to take additional Science subjects in order to acquire enough Science points to graduate.

Separate course plans are available for students enrolled in the following courses:

- **B.Sc./B.E. (Electrical, Computer and Software streams)**
- **B.E./B.Sc. (Mechanical and Manufacturing)**
- **B.Sc./B.LLB.**

Students enrolled in B.A./B.Sc. and BCom/BSc have sufficient flexibility in their course to follow the BSc 2xx and 3xx plans and to determine their own plan in consultation with an advisor.

Students enrolled in BbioMedSc should see a BbioMedSc advisor or stream coordinator for one of the eight possible streams: typical streams can include Physics 151/152 or 121/122; Maths 151/152 or A and B; Applied Maths or Stats; and selected second year physics courses.

Students doing other courses [e.g. BForSc/BSc, BSc/BIS, BGeomE/BSc, and other streams (Civil, Chemical) of Engineering B.E./B.Sc.] and wishing to major in Physics should consult the Physics Higher Year Course Planning Co-ordinator, details below.

Further information

- The University Handbook: <http://www.unimelb.edu.au/HB>
- The Physics Higher Year Course Planning Co-ordinator, Dr Lloyd Hollenberg, Room 415, Level 4, Physics Building, E-mail: l.hollenberg@ph.unimelb.edu.au