



# Royal Australian Institute of Parks & Recreation

(Incorporated in Victoria)

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AUSTRALIA

*John Lead  
Traver Atter  
David Aldous*

28th March 1985

Dr. D. Aldous

[REDACTED]  
CROYDON VIC 3136

*Dear David,*

*The attached letter was received yesterday at this office. In the interests of maintaining professional standards in the horticultural field, and a certain degree of commonality between training courses in the various states, I thought that you would be the appropriate expert to express comments on behalf of the Institute.*

*I appreciate that you are very busy with a heavy workload from your primary and secondary duties, but I am hoping that you (or perhaps one of your staff experts) may be able to find time to provide comments on the degree program in Urban Horticulture proposed by the [REDACTED].*

*Thank you in anticipation,*

*Yours sincerely*

*Ian Taylor*

Ian C. Taylor  
ADMINISTRATOR

22 March, 1985

The Secretary,  
The Royal Australian Institute of Parks and Gardens,  
PO Box 3,  
Belconnen, ACT 2616

RAIPR

Dear Sir/Madam

27 MAR

1985

I would greatly appreciate the comments of your Department on the enclosed proposal for a degree programme in Urban Horticulture.

In 1982, the School of xxxx of the xxx Institute of Technology was approached by the xxxx of TAFE with the request that the School develop a professional level course in urban and environmental horticulture for holders of technical qualifications in the areas of amenity or ornamental horticulture, landscape construction and maintenance, parks and recreation, or revegetation and management. The proposed course would provide professional studies on a part-time basis for technically qualified entrants who are working in some relevant industry, government and commercial situation. At present there is no route by which such people can continue their professional education or upgrade their qualifications.

Professionally qualified personnel are required in a number of fields of urban and environmental horticulture. These include the nursery industry, local government planning, and the establishment and maintenance of ornamental plants for streets and buildings, in park areas, and for other amenities. In addition the field covers national parks, the regeneration of areas subject to soil erosion or disturbed by urban and industrial impact, and the establishment of buffer zones of various types. Professional studies in the production and use of plant materials, and an introduction to both technical and financial management are required.

The availability of a degree course in a new area, of course, opens up avenues of research and development as well. Australia, for example, lags far behind Britain, Europe, the U.S.A. and Japan in the breeding of native species for retail use, as landscaping specimens, or for export purposes.

In designing the most appropriate degree programme we are now seeking a wide range of external advice on the nature and content of the course, the latest development in the field', the possible demand for graduates and the structure of the industry. We would be very grateful, therefore, if you would complete the attached survey and return it along with any comments you might care to make.

Yours sincerely,

.....

Xxxx

Head of School

XXXX INSTITUTE OF TECHNOLOGY  
SCHOOL OF XXXX

SURVEY ON PROPOSAL FOR A DEGREE COURSE IN URBAN HORTICULTURE

(Please return this sheet to xxxx; if possible by -21 APRIL-  
,1985.)

Department/Instrumentality:

**ROYAL AUSTRALIAN INSTITUTE  
OF PARKS *AND* RECREATION  
(INCORPORATED)  
P.O. BOX 3  
BELGONNEN A.C.T. 2616  
(062) 51 4745**

Address:

Contact Name

(if applicable)

Phone:

Tick or insert answers in boxes as appropriate, and add any further comments at end.

I.     Would you support the general concept of a degree course in urban and environmental horticulture, to be offered on a part-time basis?

YES

NO

2. Does the proposed course outline for the degree course in Urban Horticulture (p.18 ff of enclosed document) have about the right balance of theoretical science, horticultural studies, and landscape or nursery management, or would it be improved by altering the weightings?

satisfactory as is

more

less

Needs:

Theoretical science:

Horticultural studies:

Landscape management:

Nursery management :

3. Approximately how many staff in your Department/Instrumentality have technical qualifications in the following areas:

No.

Horticulture

Landscape or  
Parks/Gardens

or Combined  
Total

Greenkeeping/  
Turfkeeping

4. A recent survey carried out by TAFE showed that a high proportion of holders of appropriate technical qualifications would be interested to undertake a degree course of the type proposed. Would there be a career advantage in your Department/Instrumentality for technically qualified personnel to complete a degree of Applied Science in Urban Horticulture?

Yes

No

5. In the next one to two decades, is there likely to be a need for people with post-graduate qualifications in any area of urban and environmental horticulture (e.g. cultivar breeding and utilisation, revegetation programmes and management, open-area planning and maintenance, or nursery production and management),

(a) in the community as a whole?

Yes No

(b) in your Department/Instrumentality?

Yes No

6. Any other comments.

Thank you.

XXXX INSTITUTE OF TECHNOLOGY

FACULTY OF XXXX

SCHOOL OF XXXX

STAGE III PROPOSAL FOR UG1 COURSE IN

URBAN HORTICULTURE

JANUARY 1985

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STAGE 111 PROPOSAL

SCHOOL OF XXXX

UG1 COURSE IN URBAN HORTICULTURE

NAME OF INSTITUTION

XXXX

FIELD OF STUDY

Urban Horticulture. The course will include amenity/ornamental horticulture, the use of plants in urban and related situations and environmental horticulture.

LEVEL AND NAME OF COURSE

A UG1 course is proposed. The name of the course would be Bachelor of Applied Science, in Urban Horticulture (B.App.Sci.)

The course name, Urban Horticulture has been carefully considered by the School and the Consultative Committee. At present there is no single title well accepted by either industry or educational institutions that covers the whole of the field proposed. The terms 'amenity horticulture', 'ornamental horticulture', 'landscape horticulture' and 'environmental horticulture', are used here and overseas, and were all considered. It was finally decided that term Urban Horticulture, used by the University of Washington, best incorporated the range and emphasis of the proposed course.

PROPOSED FORMULA FUNDING CATEGORY

The appropriate formula funding category for the course is the same as that for other highly technological specialties in life science, such as biomedical science, that of Special Applied Science.

YEAR OF INTRODUCTION

1986

AIM OF THE COURSE

To provide professional level education and training in urban horticulture for men and women who have already obtained qualifications and experience at the technical level in ornamental, horticulture and/or landscape studies.

In particular the course aims to produce scientific personnel who can take their place as members and leaders of professional teams in nursery production, in plant breeding and development including Australian cultivars, in landscape management, or regeneration programmes in disturbed ecosystems.

The course is designed for students who already possess a UG Diploma in Horticulture, or equivalent.

The course will be offered initially on a part-time basis only, involving four years of attendance, with an average of 12 hours per week of class work for two 18-week semesters per year. The students would follow the existing attendance pattern for part-time students in the School, that is one afternoon and three evenings per week. At the same time the student is expected to be gaining practical experience in a relevant industrial organisation. For this purpose he or she is required to enrol, each semester in a professional experience project relevant to the course, and supply details of the experience gained. In this way the School will monitor the practical experience, its requirements being broadly equivalent to four years of approved' experience.

Depending on future demand for the course, the programme could also be offered on a sandwich pattern.

## NEED AND DEMAND FOR THE COURSE

### Background

The Environmental Biology major of the Applied Biology degree course in the School of xxxx aims to provide graduates competent in the monitoring and management of disturbed ecosystems. Consequently there has been a long standing interest in the School in landscape considerations and regeneration of areas affected by mining and other industrial activities. Some of the graduates in Environmental Biology are now working on these sorts of problems.

The first suggestion for an extension of undergraduate studies into environmental horticulture was made in the School in March 1981, in a submission to the Committee set up to consider the future of the then School of xxxx and the xxxx campus of the Institute. The submission pointed to a need for professional level courses in xxxx that would provide expertise in plant breeding and selection in the context of ecology, and environmental assessment and management.

In 1982 the xxxx was approached by TAFE with requests for liaison on development in several areas, including amenity horticulture. Since then discussions have been held between the School and the TAFE xxxx and xxxx School of xxxx, as well as with other consultants. The work has confirmed a need for a professional level course in horticulture that would lead to careers in the nursery industry, or in the management of parks, gardens, or disturbed ecosystems.

### Scope for specialisation

There is a need for professional level education *and* training in urban horticulture, including nursery production, planning and maintenance of parks and recreation areas, and other amenities and regeneration activities in areas disturbed by urban and industrial impact. There is a particular need to provide professional studies on a part-time basis for students who have already obtained technical qualifications in the area, and are working in relevant employment concurrently with their academic work.

Four broad areas exist in which urban horticulture graduates are required. First, in the nursery industry, the development and operation of new techniques and practices, production planning, and management call for advanced professional training. As a recent press resume put it: 'The cottage industry image has gone. Today the successful nurseryman needs to know about balance sheets, how to grow a plant in the smallest possible area to the strictest specifications, and put it on the market at a predetermined date.... The industry is becoming highly automated. with computer-controlled climates bringing plants on to the market on the very day they are needed.' (SMH 27/8/83)

The technological advances in the industry are linked also with second avenue of graduate employment in amenity horticulture genetics, breeding and cultivar development, of both exotic, and, more particularly, Australian species. Although some: enthusiastic individuals, generally working alone, have done some valuable work, Australia as a whole lags far behind Britain Europe and the U.S.A. in the breeding of their native species as ornamentals for residential gardens, as landscaping specimens for urban planning, or for regeneration purposes. The proportion of native species used and developed in this country is miniscule, though the potential is vast. The export of Australian plant varieties is also a promising industry, with the possibility of making our natives as valued exotics in other countries, as overseas species are here. The field of genetics and breeding of natives is important for general research purposes as well. Here, botanical gardens and similar organisations have an interest. Findings can help to elucidate the evolutionary history of speciation of the Australian flora, as well as the ecological and physiological ranges of natural and hybridised genotypes for commercial purposes.

Thirdly, there is an increasing number of horticulturalists employed by local government authorities, private landscape consulting firms, and regional authorities, in the maintenance, management and planning of parks, gardens, recreation reserves, and other projects. The professional horticulturalist can be expected to take his or her place alongside engineers and architects in the planning and provision of such facilities. The development and operation of planting programmes, including pest and weed control, are areas where a specialised knowledge of horticulture and ecology are required.

A fourth area in which there is a growing need for biologists with a specialised knowledge of horticultural principles and practices is in regeneration of open bushland and wilderness areas disturbed by urban development, mining operations, road construction, powerlines, heavy industrial installations, and the like. Both private companies and government instrumentalities are now required under State environmental planning and other legislation to include environmental impact statements along with development applications for various activities either scheduled under the relevant regulations, or otherwise deemed likely to cause disturbance to the environment. In addition, as part of the operation and maintenance functions of such developments, or in their aftermath, planting programmes for environmental buffer zones, or for regeneration are called for. Some of the Environmental Biology graduates from xxxx are already employed in programmes of this type. A new degree course in Urban Horticulture would form an excellent complement to current studies.

In each of the avenues of specialisation outlined above there is a need for professional officers who can plan and carry out testing programmes for soils, plants, pesticides, etc., and can evaluate the results. Skills in experimental design, data analysis and computing are wanted, as well as those associated with the technology of propagation and production. These are included in the proposed curriculum for the new degree.

## Findings of Investigations

Approximately 200 students per year are enrolled in the Associate Diploma course in amenity horticulture run by TAFE in this State. Associate Diplomas in Horticulture are also offered at xxxx and xxxx CAEs. In addition others with tertiary qualifications are employed in relevant horticultural and local government situations for which the proposed course would be of value.

The report has recently been completed of an investigation into the need and demand for professional level studies in amenity horticulture, the study being carried out by xxxx Senior Education Officer, Curriculum Research and Development Unit of TAFE. The survey involved questionnaires and interviews with a number of nurseries and parks and gardens organisations, to determine the need for professional personnel in the industry. It also included a questionnaire administered to graduands and graduates of the Associate Diploma and Certificate courses in Horticulture, working in the industry, of whom 80 per cent expressed interest in studying for a higher qualification if available.

The investigation revealed a clear need for professional personnel in amenity horticulture. The professional tasks identified in the study can be summarised in several areas.

Scientific functions in nursery industry:

- (a)
- undertaking trials of plants, growing media, etc.
  - plant manipulation
  - diagnosing plant problems
  - evaluation of new species and varieties
  - assessing transportability of plants
  - drawing up specifications for new nurseries/extensions.

(b) Scientific functions in parks and gardens:

- assessing species for planting of public areas
- undertaking bushland rehabilitation and/or regeneration
- diagnosing plant problems
- drawing up specifications for new facilities.

(c) In management, the two bodies of people have some interests in common, for example:

- managing of staff; all aspects
- managing of administrative and technical changes
- managing finances
- effective use of computers
- and, in the nursery industry, local and overseas
- marketing forecasts, and advertising
- and, in parks and gardens, assessing and accommodating community needs, allocating priorities, and public relations.

Significance of Proposed Programme

The proposed degree programme, with the assumed knowledge froth the Associate Diploma, the studies undertaken at the Institute; and the concurrent horticultural practice work *and* general industrial experience, forms a package designed to produce graduates with skills to enter any wing of the industry as professional officers. Graduates will be able to progress on either a scientific or a management career



path, for either of which, if they choose, they may also complete further postgraduate course work.

#### CONSULTATIVE COMMITTEE

Detailed discussion on this proposal have taken place between the School of xxxx of this Institute, and the School of xxxx and xxx School of Horticulture of TAFE. In addition discussions and several meetings have been held with industry representatives of urban and ornamental horticulture. The Consultative Committee for the proposed programme has to date comprised the following members:

10-EXISTING RELATED TRAINING FACILITIES IN XXXX

The University of xxxx offers a final year horticultural specialty within the degree course in Agriculture, and xxxx CAE is at present introducing a UG1 course in Horticulture. These courses includes crop production and marketing, pomology and viticulture, in addition to amenity horticulture and urban and environmental 'considerations. It is therefore not the sole aim of these courses to produce graduates in urban horticulture. Furthermore these courses do not cater for people in the workforce as they are not offered on a part-time evening basis, nor do they take account in their curricula of previous qualifications and experience in horticulture.

There is an undergraduate degree course in Landscape Architecture at the University of xxxx, and a second-degree course in Landscape Studies at the University of xxxx. In terms of the training of professional personnel these courses would complement the one proposed.

RELATION OF COURSE TO COLLEGE'S INSTITUTIONAL PROFILE

As mentioned earlier, this course forms a very good complement to course work already offered in this School, particularly in the Environmental Biology major of the Applied Biology degree course. Some of the curriculum for the new course will be made up of subjects already offered in that course. Conversely, some of the subjects in the new course could be offered as electives to students in the Environmental Biology major.

The Faculties of Engineering and Architecture in this Institute are concerned, among other matters, with environmental planning and other local government legislation, environmental impact statements, parks and recreational facilities, and landscape studies. The Faculty of Business runs undergraduate and postgraduate courses in marketing, accounting, business and public administration and finance and economics. Some collaboration could be expected with these Faculties in the new degree course, as happens now from time to time on other projects in the School. Certain of the library and film resource of these Faculties are of direct relevance to the proposed degree course.

POSSIBILITIES FOR FURTHER STUDIES

Graduates from the proposed course would be eligible to enter a variety of postgraduate courses both at this Institute and elsewhere.

At the xxx, the following postgraduate courses would be available to graduates of the proposed course:-

(a) In Business Management

The Faculty of Business of this Institute offers Graduate Diplomas in Administration, Marketing, Employment Relations and Public Sector Management. These courses would be suitable for graduates of this course who wish to, pursue careers to middle and senior management positions in the nursery industry, with a landscape firm, in local government, or with an industrial concern.

(b) In Plant Sciences

This School offers a Master's Degree in Applied Science by thesis, designed such that graduates who are working in a relevant industry can undertake further studies. In this case, studies could well include, for example, plant production, genetics and breeding, or pathology, or revegetation and management studies.

OTHER POSTGRADUATE STUDIES

In addition, graduates in Urban Horticulture would be qualified to enter courses in Landscape Studies at the University of xxx; the Diploma and Masters degree courses in Urban and Environmental Studies at xxx University; the Diploma and Masters degree courses in Town and Country Planning at the University of xxx; and Masters or Doctoral programmes at universities and colleges in business management, plant sciences,

EXISTING AND REQUIRED RESOURCES

(a) Laboratories

The xxxx campus has good laboratory facilities botany and environmental biology, biochemistry microbiology. The School also has two sets of environmental cabinets. Existing laboratories would be generally adequate for the teaching of the proposed degree, assuming that recurrent funding were adequate to support it.

(b) Library Resources

The xxxx campus houses the life sciences collection of monographs and serials for the Institute. Some tape/slide and video materials, with viewers, are also held at xxxx, although the main film library is held in the city. The Information Resources Service of the Institute is due to move into a new building on the xxxx campus during 1984. The central library will hold the Engineering and Architecture collections, as well as those for the other Faculties of the Institute.

Titles from diverse areas of the collection would be of value for the purposes of the new degree, course. However funds would be needed to build up an appropriate collection for urban and environmental horticulture. In the meantime, graduates of the TAFE Diploma in Horticulture would retain borrowing rights from TAFE libraries, in particular the very good library at the xxxx. If TAFE joins the xxxx library network as anticipated reciprocal borrowing rights will be established with the Institute library.

(c) Glasshouse Facilities

The School has a glasshouse and plant physiology laboratory as part of the complex of the xxxx, conducted jointly by the Institute and the xxxx. This glasshouse is almost fully occupied with present teaching and research activities. The new degree programme will be wholly reliant in the first instance on the facilities of the xxxx School of Horticulture. It is hoped that the nursery industry and local government agencies will also make available facilities for project work from time to time. However, as the course developed, more Institute glasshouse facilities would be required at or near the xxxx campus, which would include automated environmental controls for propagation, production and testing purposes. An outlay of \$160,000 to \$200,000 would be involved.

(d) Herbarium

The School has a small herbarium collection of native and some weed species. This would need to be expanded considerably to serve adequately the purposes of the new degree.

(e) Liaison with TAFE

It is envisaged that the new programme, which has arisen from discussions with the School of xxxx and the xxxx School of Horticulture, will be characterised in its operation by collaborative use of facilities with TAFE. In addition to the library and greenhouse facilities mentioned previously, TAFE can make available a range of facilities throughout the State, valuable plant material, and expertise. This philosophy of collaboration between the Institute and TAFE for this programme has the strong support of the Consultative Committee.

(f) Academic Staff

A number of academic staff from the Departments of Applied Biology, Biochemistry and Microbiology are now teaching subjects included in the curriculum for the proposed degree. In addition present staff could participate in a number of subjects in the proposed course. The School would also need two extra academic staff positions to mount the new programme for a limited intake of 20 to 24 per year. If demand proved sufficient up to two more staff positions would be needed to cover increases in all the School subjects concerned, as well as in the specialised areas. Specifically expertise would be required in horticulture with some experience with native flora, and plant pathology.

(g) Technical Staff

As with academic staff, as successive stages of the course were introduced, laboratory duties and those associated with glasshouse work, environmental control etc., would involve initially two extra technical staff positions and possibly another two later, depending on future intake for the course.

Summary of Resources Required

- (1) Normal recurrent monies for library and plant.
- (ii) Initially, two academic staff positions, possibly later be increased to four.
- (iii) Initially two technical staff positions, possibly later to be increased to four.
- (iv) Provision of glasshouse facilities with controlled environment capabilities: \$160,000 \$200,000, plus \$10,000 for upgrading of herbarium.

COURSE DETAILS

ENTRANCE QUALIFICATIONS:

Possession of an Associate Diploma in Horticulture, or equivalent for which Credit will be given for the first two stages of the degree course. An outline of the course for the Associate Diploma in Horticulture in the School of xxxx of TAFE is attached.

ATTENDANCE PATTERN:

Part-time, in the first instance. Attendance normally entails one afternoon and three evenings (12 hours) for week, plus any fieldwork requirements.

ASSUMED KNOWLEDGE

Includes some knowledge or experience at the technical level in the following areas:

1. basic understanding of soil properties and soil types
2. basic understanding of plant anatomy and morphology
3. basic understanding of plant growth characteristics
4. basic understanding of plant physiology
5. practical knowledge of exotic and native species and their uses indoors, outdoors, in landscaping, etc.
6. practical skills in propagation methods, such as:

- seed collection
- dry storage
- cold and warm stratification
- transplant and direct seeding methods
- use of vegetative structures, bulbs, runners etc.
- leaf cuttings
- grafting
- use of rootstocks
- layering
- hormone treatment
- tissue culture
- cloning and breeding methods

practical skills in cultivation including the control of environmental variables:

- growing media
- levels of fertilisation
- control of tilth
- control of organic matter
- temperature control
- water control
- mulching
- drainage
- soil water holding capacity
- soil aeration
- frost avoidance
- control of greenhouse parameters including daylength

practical skills of plant maintenance including:

- training
- pruning, (heading, thinning, disbudding, etc.)
- seasonal considerations of pruning and training
- hormonal, nutritional, and daylength control of flowering times



9. identification of common pests and diseases; symptoms and treatments
11. weed control
9. elements of landscape design, construction and maintenance; including:
  - topography and layout
  - line and form
  - wall and path construction
  - drainage and water supplies
  - the uses of colours, textures and aromas
  - ground cover
  - shade plants
  - types of urban spaces, including home gardens, streets, squares, around public buildings, in parks and bushland areas
10. some familiarity with nursery practice; handling and marketing
11. some familiarity of principles of organisation, management, costing, etc.
12. in addition, it is assumed that entrants will have the equivalent of 2-Unit mathematics.

PROPOSED CURRICULUM FOR DEGREE PROGRAMME

The degree course provides advanced studies in horticulture, at the same time as the student is continuing to expand his practical knowledge in his industrial employment with a relevant organisation.

STAGES 1 AND 2

Must have been completed by the gaining of the Associate Diploma in Amenity Horticulture, or equivalent.

The following is a first suggestion for a course of study in Urban Horticulture. Further consultation and curriculum planning, would be required for the development of a Stage III proposal. The course as outlined below concentrates on the professional scientific areas of urban horticulture, rather than on management. The unit on business management included is intended to upgrade and update any previous studies in the area. A postgraduate diploma in business administration or marketing would be necessary if the student wished to obtain specialist qualifications in this area.

STAGE 3

Spring

Biology 1 H (3 s/hr)  
Physical Science 1A (3)  
Hort. Science 1 (3)  
(a. Plant Structure and  
propagation)  
Hort. Experimentation (3)  
Hort. Practice I

Biology 1 H (3)  
Physical Science 1B (3)  
Hort. Science 1 (3)  
(b. The urban environment)  
Biocomputing 1 (3)

Stage 4

Microbiology 1 (6)  
Hort. Science 2 (6)  
(Growth media)  
Horticultural Practice 2

Pest Control and Plant  
Protection (6)  
Hort. Science 3 (6) (Selection  
and Breeding)

Stage 5

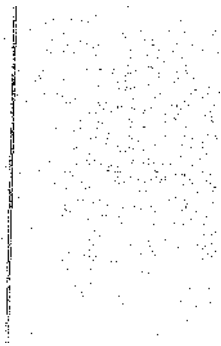
Quantitative Ecol. (6)  
Hort. Science 4 (6)  
(Uses of Plant Materials)  
Horticultural Practice 3

Plant Ecophysiology (6)  
Hort. Science 5 (6)  
(Development of Plant  
Materials)

Stage 6

Terrestrial Ecol (6)  
Business Management (3)  
Technical Management (3)  
    (A) Nursery, OR  
    (B) Open Space  
Horticultural Practice 4  
Stage 6

Hort. Science Res Project (6)  
Organisational Management (6)  
    (A) Nursery Management  
        OR  
    (B) Open -Tpace Management



## SYNOPSIS OF SUBJECTS

### Stage 3

#### Biology 1 H (6 s/hr)

Characteristics of living things. Origins of life, and cell theory. Classification of organisms into kingdoms on basis of cell structure. Structure and function of cell components. Transport of materials across cell membranes: diffusion, osmosis, active transport, pinocytosis.

Cell division; mitosis and meiosis and their significance in the life cycle of organisms. Mendelian and population genetics. The diversity of life, taxonomy and the species concept. Major groups of animals, plants and microbes.

#### Teaching Methods

Lectures, group tutorials, practical sessions, demonstration, and field and industrial excursions.

#### Assessment

Texts, essays, practical performance, tutorial participation; final examination.

Horticulture Science 1 (6 hr)

A. (Autumn semester) Plant Structure and Propagation

Anatomy and physiology of herbaceous and woody plants, and the ways in which their characteristics can be utilised for both sexual and asexual propagation of plants materials. Grafting methods, grafting unions, scion/stock relationships, reasons for incompatibility. Principles of production of pure seed, pure stock, patentable varieties.

B. (Spring semester) The Urban Environment.

The impact of humans on the natural environment. Brief history of urbanisation, and man-made changes to the landscape. The nature and uses of gardens and outdoor spaces in earlier civilisations and today. Psychological and sociological considerations of city living; social, aesthetic, and recreational uses of gardens, parks and other open spaces; introduction to planning and management of open spaces. Case studies from the xxx region.

Teaching Methods:

Lectures, group tutorials, practical sessions, demonstration, and field and industrial excursions.

Assessment:

Texts, essays, practical performance, tutored participation, final examination.

Biocomputing 1 (3 s/h)

Introduction to computers and programming using the PASCAL language. Writing and verifying programs. Applications to biostatistics and other biological and horticultural areas. An overview of computer packages and facilities.

Teaching Methods

Lectures, groups tutorials, practical sessions, demonstration,; and field and industrial excursions.

Assessment

Texts, essays, practical performance, tutorial participation; final examination.

## Horticultural Experimentation (3 s/hr)

Experimental design and analysis in amenity horticulture, including field trials, greenhouse and laboratory experimentation. Measures of central tendency and dispersion; normal, binomial and Poisson distributions; tests for significance and estimations of means and variances; tests of goodness of fit; nonparametric tests. Interpretation of results in practical situations such as testing of growth media, fertilisers, pesticides, seed viability, or cultivar performance.

### Teaching Methods:

Lectures, group tutorials, practical sessions, demonstration, and field and industrial excursions.

### Assessment:

Tests, essays, practical performance, tutorial participation, final examination.

Physical Science 1A (3 s/hr)

Review of scientific terminology, mathematical concepts, scientific notation and SI system of units. Measurement of length, mass, area and volume. Force and ratios.

Structure of matter: elements, compounds and mixtures; ions, molecules, acids, bases, salts. Atomic mass tables; the mole concept, problems related to formulae. Basic sub-atomic particles; isotopes; electromagnetic radiation.

Covalent bonding in simple compounds; shapes and polarity of molecules; weak interactions. Ionic bonding, mineral structure, electrolytes in cells and in soil.

Fluid statics and flow, surface tension and capillarity. Voltage, current resistance, series and parallel circuits; electrical safety and applications of electricity in instrumentation.

Teaching Methods

Lectures, group tutorials, practical sessions, demonstration, and field and industrial excursions.

Assessment

Tests, essays, practical performance, tutorial participation, final examination.



Physical Science 18 (3 s/hr)

Heat and temperature; specific heat capacity; changes of state; heat transfer ideal gas law; partial pressures; humidity. Motion and kinetics, position, velocity and acceleration; kinetic theory of gases.

Organic chemistry; the carbon atom and classification of organic compounds. Hydrocarbon and their halogen derivatives; alcohols, ethers, aldehydes and ketones; acids and esters; amines and amides; optical isomerism; amino acids and protein; carbohydrates.

Chemical reactions and heat; heat of formation; combustion and bond energies for simple organic compounds involved in living organisms. Factors affecting rates of reaction. Equilibrium law, pH buffer solutions, with examples in living systems. Comosis.

Classification of compounds of importance in horticulture, such as fertilisers, pesticides, herbicides, hormones, manufactured growth media, plant products.

Teaching Methods:

Lectures, group tutorials, practical sessions, demonstration, and field and industrial excursions.

Assessment:

Tests, essays, practical performance, tutorial participation, final examination.

Horticultural Practice 1 (2,3,4) (6 + 6 s/hr)

This programme continues over the four stages of the course, and includes a log of relevant experience, plus a series of small projects on skills and experience arising out of the work situation. The project work is expected to occupy an average of 6 hours per week throughout the course, and will include aspects of the production and use of plant materials in a range of situations.

Assessment:

The student will submit a logbook and report, which will be evaluated. Staff will also make site visits from time to time to hold discussions with the student and his work supervisor.

Stage 4

Microbiology I (6 s/hr)

An introduction to the structure, function and taxonomy of the bacteria, fungi, protozoa and viruses. A survey of selected topics including microscopy; elementary immunology; microbial ecology; sterilisation and disinfection and microbiological techniques.

Teaching Methods:

Lectures, group tutorials, practical sessions, demonstration, and field and industrial excursions.

Assessment:

Tests, essays, practical performance, tutorial participation, final examination.

Pest Control and Plant Protection (6 s/hr)

Biology and control of animal pests, microbial organisms, and weeds which affect the quality of growing plants, timber and stored substances. Aspects of toxicology and pharmacology of biologically active substances.

The recognition of disease conditions in horticultural plants; diseases of roots, shoots, vascular tissues, flowers or fruits. Host/parasite relationships and cycles of disease. Chemical and biological control of pests and diseases; prediction and management of disease. Legislation with respect to plant protection, with particular reference to ornamentals.

Teaching Methods:

Lectures, group tutorials, practical sessions, demonstration, and field and industrial excursions.

Assessment:

Tests, essays, practical performance, tutorial participation, final examination.

Horticulture Science 2 (6 s/hr)

(Growth Media)

Physical characteristics of soil; structure, texture, aeration, water. Chemical characteristics of soil-clay structures, ion exchange capacities, soil organic matter, soil microbes and other biota. Pedology, processes of weathering, erosion and soil formation. Ion uptake by plants; mycorrhiza and the rhizosphere. Nutrient cycling in natural and cultivated areas. The distribution and mapping of Australian soils; changes in soils brought about by fertilisers, irrigation, cultivation practices. Characteristics and uses of other growth media.

Teaching Methods:

Lectures, group tutorials, practical sessions, demonstrations, and field and industrial excursions.

Assessment:

Tests, essays, practical performance, tutorial participation, final examination.

### Horticultural Science 3

#### (Selection and Breeding)

Molecular biology of plant cells and cellular products; DNA control of cellular constitution via protein synthesis; cytoplasmic inheritance; cell differentiation - environmental influences on the activity of the cell nucleus. Genotype and phenotype variation in natural and cultivated plant populations, and the exploitation of genetic variation for plant production. Conventional methods of selection, breeding and hybridisation, including use of aneuploids and polyploids. Tissue culture, micropropagation, somaclonal variation, somatic cell genetics and hybridisation. Introduction to the use of agrobacteria. plasmids and opines in plant genetic engineering; use of laser technology in tissue grafting.

#### Teaching Methods:

Lectures, group tutorials, practical sessions, demonstration, and field and industrial excursions/

#### Assessment:

Tests, essays, practical performances, tutorial participation, final examination.

Stage 5

Quantitative Ecology (6 s/hr)

Measurement and analysis as part of the resource management process. Techniques of estimating population size and density of sedentary organisms; sampling methods, assessment and data analysis in aquatic and terrestrial systems. Techniques for sampling multi-species communities and mobile organisms. Estimations of biomass and productivity. Principles of identification and categorisation of key groups of indicator organisms in aquatic and terrestrial systems, including major groups of plants, invertebrates and microbial groups. The design and use of keys. Collection, preservation and identification of specimens, from the field.

This subject will include a compulsory field excursion to develop skills of field identification of organisms and measurement techniques, both aquatic and terrestrial.

Teaching Methods:

Lectures, group tutorials, practical sessions, demonstration, and field and industrial excursions.

Assessments:

Tests, essays, practical performance, tutorial participation, final examination.

Plant Ecophysiology (6 s/hr)

Principles of plant classification with reference to Australian groups. Introductory geology, soil formation, soil structure, classification and analysis. Anatomical and other responses of plants to environmental stress. Carbon metabolism and factors affecting growth and development. Nitrogen fixation and nutrient cycling the role of plants in the biosphere.

This subject will include compulsory field excursions.

Teaching Methods:

Lectures, group tutorials, practical sessions, demonstrations, and field and industrial excursions.

Assessment:

Tests, essays, practical performance, tutorial participation, final examination.



Horticultural Science 4 (6 s/hr)

(The Use of Plant Materials)

Introduction to plant phylogenetic taxonomy. The distribution, ecology and uses of species and varieties in amenity horticulture. Matching the plants to the environment. Site analysis and evaluation of the microclimate for light and shade; wind, moisture, etc., and purposes of plantings, for windbreak; visual screen, creation of textured landscape, etc. Utilisation of the morphological, physiological and ecological characteristics of the plant, and its life cycle, to site requirements. Principles of nursery production of tailor made stock for a variety of site uses.

Teaching Methods:

Lectures, group tutorials, practical sessions, demonstration, and field and industrial excursions.

Assessment:

Tests, essays, practical performance, tutorial participation, final examination.

Horticulture Science 5 (6 s/hr)

(The Development of Plant Materials)

The matching of plants and places used as a model of amenity horticulture for both nursery industry and open space management, the process involving site evaluation, design of planting, the propagation of plant materials, and the establishment and maintenance of the plants. Reclamation and regeneration of disturbed areas. The taxonomy, ecology and uses of Australian native species, and their uses in revegetation programmes. The potential of natives for selection, both from natural population's and by breeding and micropropagation techniques. Site analysis of selected native environments, and consideration of plant materials and other factors required to create areas of similar structural and floristic characteristics in man-made situations. The use of natives for export purposes.

Teaching Methods:

Lectures, group tutorials, practical sessions, demonstration, and field and industrial excursions.

Assessment:

Tests, essays, practical performances, tutorial participation, final examination.

Terrestrial Ecology (6 s/hr)

Ecosystem concepts and their application to ecological management. Ecosystem dynamics. Major world ecosystems and associated non-biotic mechanisms. Major Australian terrestrial ecosystems and their management. Fire; its ecological impacts and management. Case studies in applied ecology.

This subject will include compulsory field excursions.

Teaching Methods:

Lectures, group tutorials, practical sessions, demonstration, and field and industrial excursions.

Assessment:

Tests, essays, practical performance, tutorial participation, final examination.

### Horticultural Research Project (6 s/hr)

This subject includes a 2 s/hr lecture/seminar component, plus a 4 s/hr project with report.

Project: Individually or groups of students will be assigned a small research project on some aspect of urban and environmental horticulture. The project may involve laboratory greenhouse or field work. The details of the project will depend on the particular interests and work-related opportunities of the students interest. Each student will produce a report on the project work, and present a seminar.

### Lecture/Seminar Programme

State and Federal legislation affecting planning and environment, pollution, and production and distribution of plant material materials will be considered. The significance of socio-economic factors on public decision-making on environmental matters: cost-benefit analysis and predictive of social impact. Environmental impact assessment: objectives, contract and procedures. This subject will involve a compulsory field excursion.

### Teaching Methods:

Seminars, and tutorials; individual and group research work, field excursions.

### Assessment:

Seminar participation; individual research report.

Business Management (3 s/hr)

Management goals in a business, e.g. commercial nurser, compared with those of a public utility, e.g. park authority. Principles of the development of enterprise planning; analysis of accounts, budgeting, book-keeping, marketing strategies, balance of capital and recurrent expenditure, and spending on equipment, materials, and staff. Introduction to legal considerations.

Teaching Methods:

Seminars, and tutorials; individual and group research work; field excursions.

Assessment:

Seminar participation; individual research report.

Technical Management (3 s/hr)

EITHER

Strand A-Nursery Management

Options of area layout, greenhouse construction, automated and computerised systems of control of environmental variables. Principles of composition of seasonal flow-charts for the technical nursery manager. Transport and handling of plant materials.

OR

Strand B. Open Space Management

Options of site design, construction and maintenance of open spaces; physical and biological parameters, and human uses, present and predicted, for the area. Strategies for resolving conflicts of uses. Urban forestry principles applied to the maintenance of balanced age structures in the flora of an area. Principles of construction of seasonal flow charts for the technical park manager.

Teaching Methods:

Seminars and tutorials; individual and group research work; field excursion.

Assessment: i i Seminar participation; individual research report.

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## Organisational Management (6 s/hr)

EITHER

### Strand A-Nursery Industry

The nursery as a business enterprise. Principles of production economics applied to the nursery industry. Sources of information on economic issues. Cash, credit, debt and taxation management. Criteria for investment planning. Personnel management. A systems approach to the planning, production, distribution and sale of plant materials. Advertising, standardising, grading of materials; other aspects of marketing and industry promotion. The use of computers in nursery management. Legal aspects of the nursery industry.

OR

### Strand B- Open Space Management

Human impacts on the.. Australian environment; farming, industrial development, urbanisation, transport routes, pollution, and the creation of urban open spaces. Federal, State, and local government environment and planning frameworks. The spectrum of open spaces that have to be managed, their values and uses. Systems analysis applied to open space management. Survey research methods and analysis; planning and administration of programmes of communication and education. Personnel management. Budgeting. Policy management for a balance of a healthy urban environment and conservation of natural areas. Criteria for assessment of suitable planning options.

Biology 1-H\* (3 s/hr Aut.+ 3 s/hr Spr. Identical with Biology 1T)  
Cell structure, cell division, comparative morphology of the plant kingdom. Outline of animal kingdom, with particular emphasis on groups important to plant and soil. Introduction to cell and population genetics.

Biocomputing 1 (3 s/hr)  
Introduction to computers and programming using the PASCAL language. Writing and verifying programs. Applications to biostatistics and other biological and medical areas. An overview of computer packages and facilities.

Horticultural Experimentation 1 (3 s/hr)  
Experimental design and analysis in horticulture, including field trials, greenhouse and laboratory experimentation. Designs for quality control testing of soils, fertilisers, composts, cultivars. Analysis and evaluation of results.

Horticultural Practice 1 (also 2, 3, 4) (6+ 6 s/hr)  
This programme continues over the four stages of the course, and includes a log of relevant industrial experience, plus a series of small projects on skills and experience arising out of the employment situation, and will be expected to occupy an average of 6 s/hr per week throughout the course. The project work will include aspects of *the* propagation, cultivation, and uses of a variety of cultivars, both exotic and native.

Horticultural Science 1 (3 s/hr)  
Introductory Biochemistry  
Major groups of organic compounds found in plants, e.g. alcohols, phenols, esters, etc., and the properties of the functional groups. Introduction to pathways of photosynthesis and nitrogen fixation.

Horticultural Experimentation 2 (3 s/hr)  
Experimental design and analysis applied to the testing of environmental variables (lighting, daylength, temperature, water supply etc).