# CONSERVATION BIOLOGY

M.Sc. Course Handbook

UNIVERSITY OF CAPE TOWN

**THE PERCY FITZPATRICK INSTITUTE** is recognised as a Centre of Excellence by the South African Department of Science and Technology and the National Research Foundation. It is part of the Department of Zoology at the University of Cape Town (UCT), with a focus on research and post-graduate education. Although the Institute focuses primarily on ornithological research, the Conservation Biology MSc Programme is broad-based, drawing on teaching expertise from across the academic spectrum at UCT and further afield.

Nestled on the slopes of Devil's Peak, UCT overlooks the cosmopolitan city of Cape Town. It is South Africa's oldest university, and is one of Africa's leading teaching and research institutions. It has more than 15 000 undergraduate and 6000 post-graduate students, and attracts a large number of international students, with more than 4000 students from over 100 countries.

UCT has a strong tradition in conservation research. Situated in the heart of the Cape Floristic Kingdom, it is well placed for research in two global biodiversity hotspots, the Fynbos and the Succulent Karoo. In a 2008 review, UCT ranked top among Southern Hemisphere institutions in terms of the impact of its conservation research, equivalent to the fourth-placed institution in North America.

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# introduction

Conservation biology is the study of how best to sustain and manage linked systems of people and nature. It is a new science that builds on a range of existing disciplines, ranging from ecology and evolution to sociology and economics. Conservation biology is becoming increasingly important for human wellbeing as the impacts of human activities on the biosphere become more significant.

A programme in Conservation Biology was established at the Percy FitzPatrick Institute in 1991 to educate students and conservation practitioners in the fast developing field of conservation science. The FitzPatrick Institute is housed within the Department of Zoology in the Faculty of Science at the University of Cape Town. The Fitztitute promotes and undertakes scientific studies, mainly involving birds that contribute to the theoretical and practical development of ecology, evolution, and conservation biology. The central focus of the conservation biology programme at the Fitztitute is an intensive MSc degree comprising 7 months of coursework and a 6-month individual research project.

South African society has been through a set of massive changes in the last 20 years; much of the resulting dynamism and openness to new ideas is mirrored in South African conservation. The discipline of conservation biology is undergoing a similar paradigm shift, in which notions of preservation and paternalism are being replaced by an ethic that recognizes the complexity of linked social and ecological systems and the critical need for solid interdisciplinary research. The Percy FitzPatrick Institute is contributing to this disciplinary transformation through research and teaching, while also collaborating with others to support sound, action-oriented science.

## aims & objectives

Our teaching philosophy follows the observation of William Butler Yeats: "Teaching is not the filling of a bucket, but the lighting of a fire". The general aims of the Conservation Biology MSc programme are to produce graduates with a broad understanding of conservation issues and to provide them with the scientific background and tools to be able to analyse and solve practical, conservation-related problems. A synthetic, holistic approach is encouraged to problem solving through exposure to a variety of disciplines. Emphasis is also placed on developing oral and written communication skills. We have found that this broad approach to postgraduate education produces graduates who compete successfully in the job market and go on to make a difference in the field. Although emphasis is given to solving conservation challenges in an African context, students are provided with a broad-based education that will stand them in good stead throughout the world. In 2007, in a study published in Conservation Biology, the University of Cape Town was ranked equivalent with the fourth highest North American institution in terms of the impact of its conservation-related research publications.

## who is eligible to enrol?

Applicants to join the course must hold at least a BSc Honours (or equivalent qualification). Applicants will be drawn mainly from two groups: young people who have just obtained a degree and wish to become conservation biologists, and qualified, practising nature conservators who wish to update and/or expand their knowledge of the modern theory and practice of conservation biology. The course is an intensive one, and only a limited number of participants are accepted each year. Details regarding registration fees, and approximate accommodation and living expenses in Cape Town are available on request. Prospective applicants should apply to the Director, FitzPatrick Institute, University of Cape Town, Rondebosch, South Africa 7701. Applications must reach this address before the end of August each year to be considered for a place on the course the following year. Applicants from outside South Africa are encouraged to apply early so that they have plenty of time to apply for funding and study visas. Applicants should please consult the Checklist for Applicants for the relevant documents and information that must accompany applications.

## structure of the course

The coursework component is intensive and exacting, but represents a huge learning opportunity and the chance to interact with a wide range of excellent conservation biologists, both within and outside the university environment. It includes 7 months of intensive coursework and a 6-month individual research project.

Coursework consists of a series of modules, each taught by experts in their field. Modules typically include lectures, practicals, essays, discussion groups, seminars and field excursions. Reading lists are provided. Emphasis is placed on African examples and case histories.

Appropriate computer courses are available for participants who do not have the relevant skills, but applicants are encouraged to develop at least rudimentary computer skills before enrolling. The Institute has excellent computer and library facilities.

Modules fall into four different sections: an introduction, an ecological core, an interdisciplinary core, and a synthesis. Each module lasts between one and four weeks.

The **INTRODUCTION** occupies the first three weeks and includes orientation, an overview of conservation biology, and a week studying the philosophy of science.

The **ECOLOGICAL CORE** includes modules in community ecology, population ecology, biodiversity basics, aquatic ecology, molecular ecology, disturbance and restoration ecology, and invasion biology.

The **INTERDISCIPLINARY CORE** includes modules in complex systems concepts, landscape ecology and conservation planning, climate change, resource economics, and societies and natural resources.

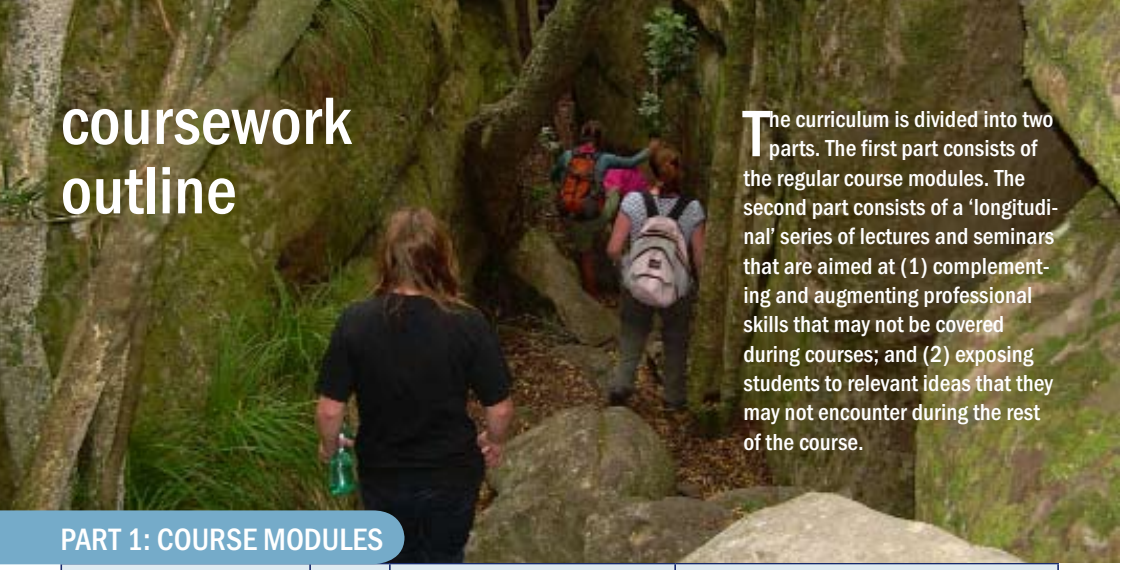
The **SYNTHESIS SECTION** consists of a section on decision support systems, discussion of "emerging issues" and a review of the course.

Modules are complemented by regular Wednesday afternoon seminars, which cover additional topics and provide students with the opportunity to meet current conservation practitioners. The coursework component of the course starts in mid-January and the modular component is completed by the end of August.

From September to mid-February, students conduct and write up research culminating in a paper on a research topic chosen by the student and supervised by a member of academic staff. The research report is in the format of a manuscript suitable for publication, which should facilitate the dissemination of results. It must be stressed that these research reports are not equivalent to dissertations produced for the award of an MSc based on a thesis alone.

Modules are examined in April-May and August. Exams are 'open book', and emphasize the solving of practical problems with a full range of resources available to students. The MSc degree is awarded to students who achieve grades in excess of 50%, and is awarded with distinction if grades exceed 75% for both the coursework and project components of the course. There is a minimum requirement for the first examination to allow students to continue with the course.

# coursework outline



The curriculum is divided into two parts. The first part consists of the regular course modules. The second part consists of a 'longitudinal' series of lectures and seminars that are aimed at (1) complementing and augmenting professional skills that may not be covered during courses; and (2) exposing students to relevant ideas that they may not encounter during the rest of the course.

## PART 1: COURSE MODULES

| SECTION | WEEK | MODULE NAME | LIKELY DETAILS |
|---|---|---|---|
| **Introduction:** *Conservation contextualized* | 1 | **Orientation** Peter Ryan | Use of library, basic skills, etc. |
| | 2 | **Overview** Norman Myers | Conservation in a global context |
| | 3 | **Philosophy of Science & Conservation Ethics** David Cumming | Limits of hypothetico-deductive science, less predictable social/ecological interactions, emergent properties |
| **Ecological core:** *Ecological foundations of conservation science*<br><br>*Revisits key concepts from a conservation-oriented perspective* | 4-5 | **Community Ecology** Phil Hockey | Biological diversity, interspecific competion, niche concepts, trophic cascades, ecosystem engineers, some models |
| | 6-7 | **Population Ecology** Peter Ryan | Extinction risk, threat categories<br>Demography and PVA |
| | 8-9 | **Biodiversity Basics** Tim Crowe | Units of biodiversity, definitions, basic evolutionary processes, macroecology |
| | 10-11 | **Ecosystem/Aquatic Ecology** Jackie King<br>Colin Attwood | Nutrients, abiotic and biotic environment, biogeochemical cycles, nitrification, limnology<br>Terrestrial vs marine approaches to conservation |
| | 12 | **Molecular Ecology** Jacqui Bishop | Genetic diversity, forensics, non-invasive sampling<br>Gene flow and phylogeography |
| | 13-14 | **Disturbance & Restoration Ecology** Sue Milton | Fire, herbivory, invasive species, restoration |
| | 15 | **Invasive Species** John Hoffman, Dave Richardson | Biology of invasions<br>Biocontrol and other control measures |
| | 16 | EXAM 1 | |
| **Interdisciplinary core:** *Conservation as a human-oriented discipline* | 17 | **Complex Systems Concepts** Graeme Cumming | Systems perspective on social-ecological systems<br>Resilience, emergence, non-linearities, self-organization, etc. |
| | 18-21 | **Landscape Ecology, GIS & Conservation Planning** Graeme Cumming | Key concepts (scale, heterogeneity, stratification) and their application in conservation<br>Key skills, especially GIS and conservation planning |
| | 22 | **Develop project proposals** | |
| | 23 | **Climate Change & Conservation** Phoebe Barnard, Guy Midgley | Climate change and its importance for people and ecosystems |
| | 24-27 | **Resource Economics** Jane Turpie | Ecosystem goods & services valuation (field based)<br>Links to livelihoods & poverty<br>Over-harvesting<br>Pricing & globalisation – subsidies, easements |
| | 28-30 | **Societies & Natural Resources** Sheona Shackleton<br>Michael Schoon | Governance, institutions, livelihoods, land tenure, social networks, policy, management & implementation, resource access<br>Ethical/cultural valuation<br>Environmental law and policy, including international conventions & agreements |
| **Synthesis** | 31 | **Decision Analysis** Astrid Jarre | Decision support tools<br>Facilitation and conflict resolution |
| | 32 | **Emergent Issues & Synthesis** Peter Ryan | Current 'hot topics' considered in light of course contents<br>Review of the course |
| | 33 | EXAM 2 | |
| | 34 | **Research project starts** | |

## PART 2: LONGITUDINAL SEMINAR SERIES

These sessions will occur on Wednesday afternoons between 2pm and 4pm. They will alternate conservation-focused topics with skills-building seminars. These may include some or all of the following:

- presentations – how to use visual aids (powerpoint) effectively
- paper writing
- paper submission
- literature searches
- grantsmanship and finding funding
- writing project proposals
- project management
- financial management
- media relations
- report writing
- reviewing papers/grants
- critical reviews of academic papers
- leading workshops/team building

# selection criteria

We accept only 12-14 students each year into the conservation biology masters programme. There are often 2-3 times this many applicants each year, resulting in competition for places. In addition to academic ability, preference is given to candidates with experience in the conservation arena, particularly in an African context. Because of the intensive nature of the programme, students spend a lot of time working closely with their peers. Having students from a diversity of backgrounds contributes significantly to the success of the programme. Consequently we strive each year to select students that combine a mix of youthful enthusiasm and mature experience, as well as a mix of students from first and third world countries. The ideal class comprises roughly one third students from South Africa, one third from the rest of Africa, and one third from the rest of the world.

Since its inception, almost 200 students have graduated from the CB programme from more than 30 countries.

# checklist for applicants

Applicants to the course, please check that you include all the following documents and information with your application. Please note that applications must reach the Percy FitzPatrick Institute by the end of August to be considered for the following year.

1. Letter of application to the Director, FitzPatrick Institute.
2. Full Curriculum Vitae giving permanent address and telephone/fax numbers, date of birth, full names, nationality, educational history up to present date, employment history (if any) up to present date, details of computer systems and software packages used to date, and details of any research publications.
3. Names, addresses, fax numbers, telephone numbers and e-mail addresses (if possible) of at least two referees who can comment on your academic ability, suitability for postgraduate study, and also give a confidential personal evaluation of your sense of initiative and computer literacy.
4. Undergraduate academic transcript showing marks for each course taken in each year. This should be a photocopy of the original, but the photocopy should have an original stamp certifying that it is a true copy of the original transcript. Certified copies of transcripts of any subsequent postgraduate qualifications should also be included here.
5. A certified copy of the original degree certificate (and any subsequent qualifications mentioned above).
6. A summary (1-2 pages, typed) outlining why you chose to apply for a place on the CB Course, what your long-term career aspirations are, and how you think the successful completion of the CB Course will benefit those aspirations.
7. Completed UCT admission forms (with the admission fee). This will be kept at the FitzPatrick Institute until the results of the Selection Committee are known. If successful, the forms (and fee) will then be sent to UCT Central Admissions Office for processing. This saves approximately one month in postal lags at a time when prompt communication becomes vital. Copies of UCT admission forms are available on request.
8. Please provide the Percy FitzPatrick Institute with details about where you are applying for funding. If appropriate, a letter of support can then be sent to them (if your application for a place is successful) to strengthen your funding application.

Address your application (or any queries) to:
The Director, FitzPatrick Institute, University of Cape Town,
Private Bag X3, Rondebosch 7701, South Africa
Tel. (+27-21) 650 3290/1, fax (+27-21) 650 3295
or e-mail the course coordinator at peter.ryan@uct.ac.za