ANU EXTENSION

BIODIVERSITY - ANU

H COURSE

B S S S AUSTRALIAN CAPITAL TERRITORY	**H Course**

The college is entered on the National Register to award Certificates delivered by this course.

☐ Yes ☐ No

College: Australian National University				
Course Title: Biodiversity - ANU		**Classification**: H		
Framework:	**Course Area:**		**Course Code:**	
Dates of Course Accreditation:	**from**	2016	**to**	2020

Identify units to be adopted by ticking the check boxes

Adopt	Unit Title	Value (1.0/0.5)	Length
☐	**Biodiversity and Threats**	**1.0**	**3Q**
☐	Biodiversity	0.5	1.5Q
☐	Extinction and Threats	0.5	1.5Q
☐	**Conservation**	**1.0**	**3Q**
☐	Species Conservation	0.5	1.5Q
☐	Ecosystem Conservation	0.5	1.5Q

H Classification: The course and units named above are consistent with H course policy and are signed on behalf of the BSSS.

Principal: / /20	Panel Chair: / /20

BSSS Office Use

Entered into database: / /20

Table of Contents

Course Name

Biodiversity ANU

Course Classification

H

Course Developers

Name	Qualifications
Helen Kaye	Bachelor of Science (ANU) Grad. Dip. Education (CCAE)
Jef Byrne	Bachelor of Science (ANU) Grad. Dip. Education (CCAE)
Judy McClintock	Bachelor of Science (ANU) Grad. Dip. Education (UC)
Sarah Rittner	Bachelor of Geography (UoC, Germany) Master of Geography (UoC, Germany) Master of Education (UoC, Germany) Doctor of Philosophy in Earth Science (UNSW)

The work of the developers of the previous Conservation Biology H course, Helen Kaye, Jef Byrne, Dr Lou Rogerson (ANU), James Woodman (ANU) and Professor Rod Peakall (ANU) are also acknowledged.

Course Length and Composition

The definition of a unit and hour requirements for a standard unit and course duration, as outlined in policies 3.2.7 Unit, 3.2.7.1 Unit Values and 3.2.6.3 Course Duration (2015 BSSS Policy and Procedures Manual), apply to H courses.

Name and Number of Units Submitted and the Length of the Units expressed as a Value

Unit Title	Unit Value
Biodiversity and Threats	**1.0**
Biodiversity	0.5
Extinction and Threats	0.5
Conservation	**1.0**
Species Conservation	0.5
Ecosystem Conservation	0.5

Available Course Patterns

Course	Minimum number of hours per course	Number of standard 1.0 value units to meet course requirements
Minor	110 hours	2 units of 55 hours

Implementation Guidelines

Arrangements for continuing students

Students completing the Biodiversity and Threats unit (22021) in the previous Conservation Biology course (2216) in 2015 may combine that unit with the Conservation unit from this course in 2016 to form a minor.

Prerequisites or co requisites home college course/s

Whilst H courses are intended to provide challenging extension experiences, students enrolled in H courses do not necessarily have to be studying the same course in their home college.

Students must be enrolled in an academically challenging science major at their home school/college for example chemistry, biology, physics or environmental science. Entry with any other tertiary science major will be at the discretion of the ANU Dean of Sciences.

The minimum recommended mathematics level is a major in Mathematical Methods.

Contribution towards an ATAR

Students can count up to 2 H courses to a maximum weight of 1.2 (equivalent to 2 minors) out of the required 3.6 in the calculation of the ATAR.

A maximum of 4 standard units from H courses can contribute to the minimum requirements for an ACT Senior Secondary Certificate and Tertiary Entrance Statement.

Reporting of H courses on the ACT Senior Secondary Certificate

Home college and H courses are reported separately, each with its own course type.

A T classified major minor and H minor in the same subject are equivalent to a double major course type.

If the student has completed insufficient H units to form a course, the units may be included in the home college course in the same course area but do not contribute to the course score. *(Refer section 10 University Programs in 2009 Policies and Procedures Manual)*

Goals

This course is intended for students in Year 11 and 12 who have an interest and aptitude in Conservation Biology or who require the skills and/or background covered in this course for further study at tertiary level.

Goals are statements of intended student outcomes. This course should enable students to develop an:

- appreciation of the contribution Science has made to a contemporary society
- appreciation of how scientific knowledge can be used to address contemporary issues
- understanding that scientific knowledge has developed over time, is used in a variety of contexts; and influences, and is influenced by, social, economic, cultural and ethical considerations
- understanding of the theories and models used to describe, explain and make predictions about systems, structures and properties
- understanding that Science is experimental and has developed through independent and collaborative research, and has significant impacts on society and implications for decision making
- ability to communicate scientific understandings, findings, arguments and conclusions using appropriate resources, modes and genres
- ability to conduct a variety of field, research and laboratory investigations involving collection and critical analysis of qualitative and quantitative data, and interpretation of evidence

- ability to critically evaluate and debate scientific arguments and claims in order to solve problems and generate informed, considered and ethical conclusions.

Student Group

Students apply to ANU for entry to this course and suitable applicants are selected at the beginning of their Year 11 year through a selection process. This process may include some or all of; a selection test, evidence provided of past academic successes, school/college recommendation.

A student who achieves a satisfactory standard in this course will be made an early offer of entry to the ANU. The offer will be for the BSc or BSc (Advanced) Hons or PhB course depending on the level of achievement. A pass in this Conservation Biology course is not a guarantee of an early offer. Early offers are decided by the ANU Dean of Sciences. Students who are made early offers will also be awarded a six point credit towards an ANU undergraduate Science course.

Assessment

There will be 4 – 6 summative assessment items for a 1.0 point unit and 2 – 3 for a 0.5 point unit.

Task Types	**Student Investigations**	**Tests**
The following examples are a guide only	Logbook Prac Report Scientific Poster Research Assignment Seminar / Oral / Electronic presentations Project Essay Models	Unit tests Practical skills test Quizzes
Weighting (most units)	40 – 60 %	40 – 60 %
Weighting (project based units)	60 – 100 %	0 – 40 %

Moderation

9.2.2 Moderation of H courses (2015 BSSS Policies and Procedures Manual)

Teachers of H courses will be required to present portfolios of student work for verification that units are taught and assessed as documented. The Moderation Officer will report any concerns to the Board.

A Year 11 review portfolio will be prepared in December, after the end of the first 1.0 point unit, for Moderation Day 1 the following year.

A Year 12 review portfolio will be prepared by Week 3, Term 4 following the completion of the Year 12 unit at the end of Term 3.

Review portfolios will present the work of two students at different grade levels. Grades in H courses are not subject to moderation.

Bibliography

Recommended Text

Primack, R.B. (2012) *A Primer of Conservation Biology* 5th Edition. Sinauer, Sunderland USA

Reference Books

Lindenmayer, D. & Burgman, M. (2005) *Practical Conservation Biology.* CSIRO Publishing, Collingwood, VIC.

Shultz, S. M. et al. (1999) *Conservation Biology with RAMAS Ecolab*. Sinauer, Sunderland.

Gifford R.M, Steffen W & Finnigan J.J and Fellow members of the National Committee for Earth Science (2010) *To Live within Earth's Limits.* Australian Academy of Science, Canberra, Australia.

Gibbs J.P, Hunter M L Jr, Sterling E.J (1998) *Problem- Solving in Conservation Biology and Wildlife Management.* Blackwell Science, Inc. Carlton VIC.

Van Dyke F (2003) *Conservation Biology Foundations, Concepts, Applications* McGraw-Hill Higher Education New York USA

Primack, R.B. (2014) *Essentials of Conservation Biology* 6th Edition. Sinauer, Sunderland USA

Kennedy, M., (2014) Introducing *Geographic Information Systems with ArcGIS*: *A Workbook Approach*, 3rd Edition , John Wiley & Sons, New Jersey USA

The Atlas of Living Australia, ttp://www.ala.org.au/ National Research Infrastructure for Australia. Last updated Friday 14 August 2015. An Australian Government Initiative.

Begon, M, Harper, J.L, Townsend, C.R (1996) *Ecology: Individuals, Populations and Communities*. Blackwell Science, Oxford, UK

Biodiversity and Threats Value 1.0

Specific Unit Goals

This unit should enable students to:

- understand what conservation biology is and why it is needed
- understand the biodiversity crisis and the contributing factors
- appreciate the need for conservation of biodiversity, and gain knowledge of the major threats to the viability of threatened natural populations, species and ecosystems
- conduct a scientific investigation using scientific methodology
- apply knowledge and have an understanding of environmental principles
- conduct computer-based simulation practicals
- solve problems in familiar and unfamiliar contexts
- critically research, analyse, evaluate and synthesise information from a variety of sources, including their own work and the work of their peers
- ability to communicate clearly by:
    - developing skills in library research and the use of information technology, and
    - critical evaluation of relevant published literature.

Content

Conservation and Biodiversity

Conservation biology – principles and characteristics

The biodiversity crisis - Why is conservation needed?

Why should we conserve biodiversity? - The value of biodiversity

- Intrinsic value
- Ethical values
- Economic benefits

Biodiversity

What is biodiversity?

- Species diversity and abundance
- Different levels diversity: from genes through to ecosystems

Components of biodiversity – genetic, species, ecosystems

What is the appropriate unit for conservation?

Global species diversity

- Methods for estimating total number of species

Local species diversity

- Diversity indices
- Rank-abundance diagrams

Patterns of biodiversity

Global, regional and local patterns

Spatial factors that influence species diversity

- Productivity
- Spatial heterogeneity
- Environmental harshness

Temporal factors that influence species diversity

- Climatic variation
- Disturbance
- Evolutionary time
- Habitat area and remoteness – Island Biogeography Theory

Rarity

Endemism

Biodiversity hotspots

Mega-diverse countries

Extinction

Past extinction rates

Current extinction rates

Extinction processes

- Species vulnerability
- Metapopulations

Threats to Biodiversity

Habitat destruction

Habitat degradation and pollution

Habitat fragmentation

Exotic species

Overexploitation

Climate change

Teaching and Learning Strategies

A range of strategies will be used some of which are:

- lectures, which are in PowerPoint format and available for later study through Wattle (ANU online platform)
- guest lecturers – drawn from PhD students and academics at ANU, UC and ADFA, plus park rangers and field biologists
- practicals
- selected readings
- student presentations
- computer-based modelling exercises, including RAMAS Ecolab software, geographical information system (GIS), and Atlas of Living Australia (ALA)
- field-based studies, including freshwater invertebrate sampling, spotlighting of bettongs, frog call recording, radio tracking, nest predation study and hair trap sampling

- excursions, examples; captive breeding programs at Tidbinbilla Nature Reserve and Mulligans Flat Woodland Sanctuary, National Zoo and Aquarium, Black Mountain Reserve and Mount Kosciusko.

Assessment

There will be 4 – 6 summative assessment items.

Task Types	Student Investigations	Tests
The following examples are a guide only	Logbook Prac Report Scientific Poster Research Assignment Literature Review Seminar / Oral / Electronic presentations Project Essay Models	Unit tests Practical skills test Quizzes
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Biodiversity Value 0.5

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Extinction and Threats Value 0.5

Specific Unit Goals

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Extinction

Past extinction rates

Current extinction rates

Extinction processes

- Species vulnerability
- Metapopulations

Threats to Biodiversity

Habitat destruction

Habitat degradation and pollution

Habitat fragmentation

Exotic species

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Conservation Value 1.0

Specific Unit Goals

This unit should enable students to:

- appreciate the factors affecting population regulation both at species and ecosystem level
- use simple mathematical models to predict population processes in conservation biology
- critically evaluate the methodology and conclusions of conservation biology studies
- conduct a scientific investigation using scientific methodology
- apply knowledge and have an understanding of environmental principles
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Content

Scientific method in conservation management

Scientific uncertainty

Sampling methods

Geographic information systems (GIS) and species distribution modelling

Science and small populations

Adaptive management

Conservation at the species level

Factors affecting population regulation

Special problems of small populations
- Demographic uncertainty
- Environmental uncertainty

Methods for studying populations
- Demography
- Risk assessment
- Population viability analysis
- Minimum viable population size

Conservation genetics
- Genetic variation: What it is and why it is important
- Principles affecting genetic variation within populations
    - Case Study Panther Florida
    - Inbreeding depression
    - Outbreeding depression
    - Using genetics to inform management

Managing threatened species

- Threat evaluation
- Species recovery
- *Ex situ* conservation

Conservation at the ecosystem level

Reserve design

Biodiversity surrogates

Corridors

Reserve selection

Conservation outside protected areas

Ecosystem restoration

Sustainable Management

Protected areas

Conservation outside protected areas

The Challenge of Sustainable Management

Teaching and Learning Strategies

A range of strategies will be used some of which are:

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Species Conservation Value 0.5

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Ecosystem Conservation Value 0.5

Specific Unit Goals

This unit should enable students to:

- appreciate the factors affecting population regulation at the ecosystem level
- critically evaluate the methodology and conclusions of conservation biology studies
- gain knowledge of the major legislative instruments controlling conservation biodiversity
- conduct a scientific investigation using scientific methodology
- solve problems in familiar and unfamiliar contexts
- critically research, analyse, evaluate and synthesise information from a variety of sources, including their own work and the work of their peers
- appreciate the role and implications of environmental science in the wider community – environmental, social, political and economic
- appreciate the social, political and legal contexts in which biological conservation and management must operate
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Biodiversity surrogates

Corridors

Reserve selection

Conservation outside protected areas

Ecosystem restoration

Sustainable Management

Protected areas

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