BIOL4991 Ecology & Biodiversity Project

Titles offered in 2026-27

Prof L Ashton

Research areas:

Insect ecology, plant-insect interactions, climate change.
Thermal preferences of insect herbivores.
Forest restoration, biodiversity and ecosystem processes
Moth traits along a rural-urban gradient

Prof D M Baker

Research areas: coral reef ecology, marine biodiversity, symbiosis, stable isotopes

Topics:

- Clash of the dinoflagellates! Competition amongst symbionts in marine invertebrates
- Conservation Forensics: genetics and stable isotopes to detect wildlife crime
- MarineGEO-Hong Kong: eDNA to quantify marine biodiversity

Prof T C Bonebrake

Research areas:

Tropical climate change impacts, tropical biodiversity and global change, endangered species conservation, and urban ecology.
Butterflies have served as our focal study taxa, but interests extend across a variety of species and systems. Examples of previous supervised FYPs here:
https://tropicalconslab.com/undergraduate-research

Prof Si-Chong Chen

Research area:

Plant ecology; Animal-plant interactions; Biogeography; Fruits and seeds; Invasive plants; Biological conservation; Functional ecology

Topics:

- **Biotic Interactions: The Friends and Foes of Seeds**

  Uncover the secret life of seeds. Explore the dynamic ecological war between seeds, their helpful mutualists, and destructive predators to understand what really determines a plant's survival in the wild.
- **Biogeography: Mapping Plant Diversity & Functional Traits**

  Why do specific plants thrive in certain places? Investigate the large-scale spatial patterns of plant traits to understand how flora adapts to different climates and how they might respond to a changing global environment.
- **Seed Dispersal & Germination: The Journey of New Life**

Investigate the crucial first steps of a plant's life cycle. Examine the mechanisms of how seeds travel, break dormancy, and successfully sprout under varying environmental pressures.

- **Harnessing AI for Biodiversity: Decoding Nature with Tech**

Apply cutting-edge artificial intelligence and machine learning to analyse complex ecological datasets. Bridge the gap between computer science and biology to tackle modern conservation challenges.

Prof J D Gaitan-Espitia

Research areas:

Evolutionary ecology (phenotypic plasticity, local adaptation, eco-evo dynamics)
Stress Ecology

Topic:

- Mechanisms of thermal acclimation, adaptation and evolution in ectotherms
- Seagrass ecology, blue carbon, and climate change
- Hypoxia stress in marine invertebrates
- Sea cucumber physiology and aquaculture

Prof B Guenard

Topics:

- Ecological impacts of invasive ants on arthropods and wildlife
- Diversity of ants in urban environments, is it just low and exotic?
- Ant-Hemipteran mutualism: its importance within Hong Kong habitats
- Ant-plant interactions, which benefits for the plants?
- Chemical warfare in ants: how a single Goliath deal with an army of David?
- Sociometry and morphometry of Asian ants
- Taxonomic revisions of Asian ants: describing the species.
- Island biogeography in Hong Kong ants
- Foraging Ecology of ants
- Ecophysiology of native and exotic species: is climatic plasticity explaining invasion success?
- Citizen science programs: testing their reliability and accuracy

Prof B C H Hau

Topics:

- Urban biodiversity studies

Prof Matthieu Leray

Research area:

Symbiosis; Coral Reef Resilience; Global Change; Functional Ecology; Trophic Ecology; eDNA; Marine Biogeography

Topics:

1. Nutrient provisioning and nutritional seascapes on coral reefs
2. The role of symbiosis in the resilience of coral reef ecosystems
3. Functional versatility and the persistence of coral reef communities
4. Use of molecular techniques to detect and manage rare, endangered and invasive species

Prof Guopeng Liang

Research area:

Soil Biogeochemistry; Ecosystem Carbon Cycling; Plant-Soil-Microbe Interactions; Nature-Based Solutions; Carbon Sequestration; Climate Mitigation; Soil Health; Food Security

Topics:

1. Assessing the impacts of environmental change and agricultural management on soil carbon cycling and plant productivity, while elucidating the underlying microbial mechanisms
2. Evaluating nature-based solutions to enhance soil health, ensure food security, and mitigate climate change

Prof J Merilä

Topics

- Are snakes shifting their activity in response to the warming climate?
- Resolving an identity crisis in Lesser Sunda four-fingered skinks (genus *Carlia*) using a modern molecular approach
- The curious case of the Pantar snake-eyed skinks (genus *Cryptoblepharus*): resolving species identities and biogeographic patterns in Wallacea
- The Lesser Sunda gecko puzzle: resolving the *Cyrtodactylus darmandvillei* complex across a geologically diverse set of islands
- Palaeo-diversification dynamics of elapoid snakes in the continent of Africa in an Eocene Greenhouse climate
- Name that forest skink! Resolving Timor's *Eremiascincus* puzzle using morphological and molecular data
- Hitching a ride: tracking human-mediated dispersal of the Indo-Pacific Gecko *Hemidactylus garnotii* across Wallacea
- Population genetics of Lesser Sunda colubrid snakes: how isolation on islands changes the genome of top predators
- Extra-pair paternity and maternity in White-Shouldered Starlings as inferred from molecular markers
- Can wild/captive cockatoos be distinguished based on Hydrogen and Oxygen isotope ratios?
- Hong Kong bird pet trade: a market survey
- Market survey of Tung Choi Street reptile trade
- Development of realtime PCR assay for CITES-listed sea cucumbers

- Micro-habitat suitability for flat-headed loach *Oreonectes platycephalus* in Hong Kong: implications for species management and conservation
- Population genetics of Hong Kong snakes (several different projects)
- Screening Hong Kong wild carnivores for the presence of parvovirus
- Diet analysis of wild carnivores based on isotopic analysis of whisker samples
- Roadkills in Hong Kong: identifying hotspots and victims
- Genetic diversity and inbreeding in brook stickleback (Coulee inconstant) population introduced to Finland 70 years ago
- Also happy to discuss and entertain projects based on students' own ideas

Prof Bayden Russell

I approach all of my research from an experimental perspective, manipulating conditions to test the effects on ecosystem processes. I have suggested some projects but am happy to discuss any subtidal, intertidal or laboratory-based experiments.

1. Some like it hot! Are some species better at surviving marine heatwaves?
2. Build it and they will come: biodiversity associated with oyster reef restoration in Hong Kong.
3. Any project linking marine invertebrate or algal physiology to survival under climate change.
4. How can remote sensing (e.g., cameras, drones) most effectively be used to map marine habitats in the face of climate change?

Prof C Schunter

Topics:

- Bioinformatics (e.g. analysis of lncRNA, micro RNA, transcriptome as molecular driver to the response to climate change in fish)
- Fish genetic diversity. Estimating population health
- Cleaner wrasse behaviour (experiments at SWIMS, lab work on main campus)
- Using environmental DNA for fish biodiversity surveys
- Microbial communities associated with ocean acidification on fish gills
- Population genetics of groupers

Prof Simon Y W Sin

Research areas:

Animal (bird) behaviour
Animal (bird) cognition and intelligence
Animal welfare/animal right
Mammal behavioural ecology

Prof ThiyagaRAJAN Vengatesen

Topics:

- Seafood safety and climate change
- Climate change impacts on oyster meat quality, taste and odor

- Big data and machine learning for oyster aquaculture

Prof Jin Wu

Research area:

Phenology; Global Carbon Cycles; Tropical Ecology; Restoration and Conservation; Nature-based Climate Mitigation; Ecosystem Health and Climate Extremes

Topics:

- AI for ecology
- Roles of land plant in global climate change
- Forest degradation and climate extreme responses
- Restoration and effectiveness assessments
- Climate change, fires, and post-fire recovery