# 國立臺灣師範大學課程綱要

# National Taiwan Normal University Course Outline

**一、課程基本資料**（任課教師不可異動部分，同一課程名稱此部分應相同）
**I.Course information** (maintained by Information Technology Center)

| | | | | |
|---|---|---|---|---|
| **課程代碼 Course Number** | DIC8001 | **課程名稱** Title in Chinese | 生態與保育 | |
| **英文名稱 Title in English** | Ecology and Conservation | | | |
| **全/半年 Two/one semester** | One semester | | **必/選修** Required/ Elective | Required |
| **學分數 Credits** | 3 | | **每週授課時數** Lecture hours per week | 3 |
| **開課系級 Eligible Class standing** | BIODIV Program | | | |
| **先修課程 Prerequisites** | Ecology | | | |
| **課程簡介 Course Description** | This course aims to provide students with rigorous training related to ecology and conservation. The course will cover the following topics:<br><br>1. Structure and function of community and ecosystem:<br>Interactions between physical setting and biological components<br>Driving forces of ecosystem<br>2. Habitat requirement of non- human keystone species in ecosystem<br>Identification and characterization of habitat required by species through its life history<br>3. Key processes related to ecosystem structure and function<br>Net primary production<br>Biogeochemistry<br>Ecosystem stability, resistance and resilience<br>4. Conservation of ecosystem<br>Global warming threat and human responses and adjustments<br>Characterizing ecosystem or habitat that needs for maintenance, wise use, or restoration practices (case studies) in conserving ecosystems<br>5. Ecological services and valuation of ecosystem: From structure, function, and services of ecosystem to human well-being<br><br>Selected readings that represent major advancement in ecology and conservation and related to the above topics will be given to students for in depth discussion. Professor(s) will give brief lectures on the topics and lead the discussion for approximately one quarter of the semester and students will lead the discussion for the rest. Through the discussion each student is expected to develop a research proposal and present the proposal to the class. Questions raised in the proposal are expected to make major contributions in ecology and conservation. Novel approaches and inter-disciplinary studies are highly encouraged. | | | |

**核心能力(Core competences)**

1-1■ 具備探究生命科學之專業知識
To have the professional knowledge required for designing and conducting research in life sciences.

2-1□ 能運用相關科技並精熟儀器操作，以多元方法進行獨立研究，解決生命科學問題
To be able to apply modern techniques to solve diverse scientific questions in life sciences.

3-1■ 具備針對實驗結果，進行正確分析、歸納並發表研究成果的能力
To be able to analyze experimental data rigorously, draw appropriate conclusions and publish results in scientific journals.

4-1■ 具備正確的科學態度，瞭解遵守科學倫理之重要性
To have a proper attitude toward scientific research and to adhere to scientific ethical standards.

5-1■ 能欣賞生物之美，體認生命科學對人類生存及地球永續發展之重要性。
To appreciate the beauty of life and to recognize the importance of life science to the survival of humanity and the sustainability of our planet.

| 課程目標 Course Objectives | | 對應系所核心能力 Corresponding Departmental Core Competences |
|---|---|---|
| 1 | Lectures and assigned readings are designed to provide fundamental knowledge in ecology and conservation. | 1-1,4-1,5-1 |
| 2 | Students will identify an area of interest and come up with a research proposal that aims to answer an outstanding question in that area. | 3-1 |

## 二、教學大綱（任課教師可異動部分）

**II. General Syllabus** (maintained by instructors each semester)

| 授課教師 Instructor(s) | 林登秋( Teng-Chiu Lin )、陳仲吉 (Chung-Chi Chen)、謝蕙蓮 (Hwey-Lian Hsieh) |
|---|---|

**教學進度與主題（可說明每週進度）Schedule**

Week 1 Introductions and Course Overview
Week 2 Interactions between physical setting and biological components (I)
Week 3 Driving forces of ecosystem (II)
Week 4 Habitat requirement of non- human keystone species in ecosystem: Identification and characterization of habitat required by species through its life history (I)
Week 5 Habitat requirement of non- human keystone species in ecosystem: Identification and characterization of habitat required by species through its life history (II)
Week 6 Net primary production (I)
Week 7 Net primary production (II)
Week 8 Midterm -
Week 9 Biogeochemistry (I)
Week 10 Biogeochemistry (II)
Week 11 Ecosystem stability, resistance and resilience (I)
Week 12 Ecosystem stability, resistance and resilience (II)
Week 13 Global warming threat and human responses and adjustments
Week 14 Characterizing ecosystem or habitat that needs for maintenance, wise use, or restoration practices (case studies) in conserving ecosystems (I)
Week 15 Characterizing ecosystem or habitat that needs for maintenance, wise use, or restoration practices (case studies) in conserving ecosystems (II)
Week 16 Ecological services and valuation of ecosystem: From structure, function, and services of ecosystem to human well-being
Week 17 Final Discussion, Class Evaluation, and Final Research Proposals Deadline
Week 18 Final exam

**教學方法 Lecturing Methodologies**

| 方式 Methods | 說明 Notes |
|---|---|
| ■講述法 Formal lectures | （可說明實施細節）<br>(please select suitable items from the left, and provide further information in the right column) |
| ■討論法 Group discussion | |
| □問題解決教學<br>Problem-based learning | |
| □合作學習<br>Cooperative learning | |
| □實驗/實作 Lab/Hands-On | |
| □實地考察、參訪<br>Field work | |
| □媒體融入教學<br>Media, audio, visual materials | |
| □專題研究<br>Project/Case studies | |
| □其他：Other: | (please enter any methods applied not included above) |

**評量方法 Assessment Methodologies**

| 方式 Methods | 百分比 Percentage | 說明 Notes |
|---|---|---|
| □作業 Assignments | | （可說明評量細節或欲評量之核心能力） |
| ■期中考 Midterm Exam | 20 | 1-1,3-1 |
| ■期末考 Final exam | 30 | 1-1,3-1 |
| ■課堂討論參與 Class participation | 15 | 3-1,5-1 |
| ■出席 Attendance | 5 | 4-1 |
| ■報告 Report/Presentations | 30 | 1-1.3-1 |
| □成果展覽<br>Demos/ Exhibitions | | |
| □專題<br>Project/Case study reports | | |
| □其他：other: | | (please enter any methods applied not included above) |
| **參考書目**<br>**Textbooks and References** | Ecology and Ecosystem Conservation (Foundations of Contemporary Environmental Studies Series). 2007. Wswald J. Schmitz. Island Press. | |

# 國立臺灣師範大學課程綱要

# National Taiwan Normal University Course Outline

**一、課程基本資料**（任課教師不可異動部分，同一課程名稱此部分應相同）
**I.Course information** (maintained by Information Technology Center)

| | | | |
|---|---|---|---|
| **課程代碼 Course Number** | DIC8026 | **課程名稱** Title in Chinese | 專題討論 |
| **英文名稱 Title in English** | Seminar | | |
| **全/半年 Two/one semester** | One semester | **必/選修** Required/ Elective | Required |
| **學分數 Credits** | 1 | **每週授課時數** Lecture hours per week | 1 |
| **開課系級 Eligible Class standing** | BIODIV Program | | |
| **先修課程 Prerequisites** | No | | |
| **課程簡介 Course Description** | This course is designed to expose students to a variety of important research topics in biodiversity, and to provide students with trainings in critical thinking and science communication. | | |

**核心能力(Core competences)**

1-1■ 具備探究生命科學之專業知識
To have the professional knowledge required for designing and conducting research in life sciences.

2-1□ 能運用相關科技並精熟儀器操作，以多元方法進行獨立研究，解決生命科學問題
To be able to apply modern techniques to solve diverse scientific questions in life sciences.

3-1■ 具備針對實驗結果，進行正確分析、歸納並發表研究成果的能力
To be able to analyze experimental data rigorously, draw appropriate conclusions and publish results in scientific journals.

4-1■ 具備正確的科學態度，瞭解遵守科學倫理之重要性
To have a proper attitude toward scientific research and to adhere to scientific ethical standards.

5-1□ 能欣賞生物之美，體認生命科學對人類生存及地球永續發展之重要性。
To appreciate the beauty of life and to recognize the importance of life science to the survival of humanity and the sustainability of our planet.

| **課程目標 Course Objectives** | | **對應系所核心能力 Corresponding Departmental Core Competences** |
|---|---|---|
| 1 | Expose students to various research topics in biodiversity | 1-1 |
| 2 | Provide students trainings in communicating science critically and effectively | 3-1 |
| 3 | Provide students trainings in science research ethics and strategies | 4-1 |

**二、教學大綱**（任課教師可異動部分）

**II. General Syllabus** (maintained by instructors each semester)

| **授課教師 Instructor(s)** | All Faculty Members |
|---|---|

**教學進度與主題**（可說明每週進度）**Schedule**

Week 1: Course introduction
Week 2: Guest lecture
Week 3: Guest lecture
Week 4: Guest lecture
Week 5: Guest lecture
Week 6: Guest lecture
Week 7: Guest lecture
Week 8: Guest lecture
Week 9: Guest lecture
Week 10: Student presentation
Week 11: Student presentation
Week 12: Student presentation
Week 13: Student presentation
Week 14: Student presentation
Week 15: Student presentation
Week 16: Student presentation
Week 17: Student presentation
Week 18: Student presentation

**教學方法 Lecturing Methodologies**

| **方式 Methods** | **說明 Notes** |
|---|---|
| ■講述法 Formal lectures | Handouts and powerpoint slides |
| ■討論法 Group discussion | Q&A |
| □問題解決教學 Problem-based learning | |
| □合作學習 Cooperative learning | |
| □實驗/實作 Lab/Hands-On | |
| □實地考察、參訪 Field work | |
| □媒體融入教學 Media, audio, visual materials | |
| ■專題研究 Project/Case studies | Student presentation |
| □其他：Other: | (please enter any methods applied not included above) |

**評量方法 Assessment Methodologies**

| **方式 Methods** | **百分比** Percentage | **說明** Notes |
|---|---|---|
| □作業 Assignments | | |
| □期中考 Midterm Exam | | |
| □期末考 Final exam | | |
| ■課堂討論參與 Class participation | 25 | 1-1 |
| ■出席 Attendance | 25 | 4-1 |
| ■報告 Report/Presentations | 50 | 3-1 |
| □成果展覽 Demos/ Exhibitions | | |
| □專題 Project/Case study reports | | |
| □其他：other: | | (please enter any methods applied not |

| | | |
|---|---|---|
| | | included above) |
| **參考書目**<br>**Textbooks and References** | Research papers | |

# 國立臺灣師範大學課程綱要

# National Taiwan Normal University Course Outline

**一、課程基本資料**（任課教師不可異動部分，同一課程名稱此部分應相同）
**I.Course information** (maintained by Information Technology Center)

| | | | | |
|---|---|---|---|---|
| **課程代碼 Course Number** | DIC8024 | **課程名稱** Title in Chinese | 族群遺傳與演化 | |
| **英文名稱 Title in English** | Population Genetics and Evolution | | | |
| **全/半年 Two/one semester** | One semester | | **必/選修** Required/ Elective | Required |
| **學分數 Credits** | 3 | | **每週授課時數** Lecture hours per week | 3 |
| **開課系級 Eligible Class standing** | BIODIV Program | | | |
| **先修課程 Prerequisites** | No | | | |
| **課程簡介 Course Description** | Population genetics is a discipline of genetics that studies the mechanism of gene frequency changes through time in a population and among populations. It is the fundamental basis of biological evolution. It also has been widely applied to the fields of medicine and agriculture. This course aims to introduce basic concepts of population genetics from causes of gene frequency changes to molecular evolution. Key topics in evolution will also be covered. This course should provide a solid base for other special topics in evolutionary biology and conservation, such as conservation genetics, molecular evolution, and evolutionary genomics. | | | |

**核心能力(Core competences)**

1-1■ 具備探究生命科學之專業知識
To have the professional knowledge required for designing and conducting research in life sciences.

2-1□ 能運用相關科技並精熟儀器操作，以多元方法進行獨立研究，解決生命科學問題
To be able to apply modern techniques to solve diverse scientific questions in life sciences.

3-1■ 具備針對實驗結果，進行正確分析、歸納並發表研究成果的能力
To be able to analyze experimental data rigorously, draw appropriate conclusions and publish results in scientific journals.

4-1□ 具備正確的科學態度，瞭解遵守科學倫理之重要性
To have a proper attitude toward scientific research and to adhere to scientific ethical standards.

5-1□ 能欣賞生物之美，體認生命科學對人類生存及地球永續發展之重要性。
To appreciate the beauty of life and to recognize the importance of life science to the survival of humanity and the sustainability of our planet.

| **課程目標 Course Objectives** | | **對應系所核心能力 Corresponding Departmental Core Competences** |
|---|---|---|
| 1 | Acquire the fundamental concepts of population genetics and evolution | 1-1 |

| | | |
|---|---|---|
| 2 | Learn how to critically read and evaluate scientific publications | 3-1 |
| 3 | Identify interesting research questions and propose experimental tests in the form of a grant | 3-1 |

**二、教學大綱**（任課教師可異動部分）

**II. General Syllabus** (maintained by instructors each semester)

| | |
|---|---|
| **授課教師 Instructor(s)** | 李壽先(Shou-Hsien Li)、廖培鈞(Pei-Chun Liao)、王忠信(John Wang)、町田龍二(Ryuji Machida) |

**教學進度與主題**（可說明每週進度）**Schedule**

Week 1 Class organization/Introduction/Thinking like a population geneticist
Week 2 Genotype frequencies
Week 3 Genetic drift and effective population size 1
Week 4 Genetic drift and effective population size 2
Week 5 Population structure and gene flow1
Week 6 Population structure and gene flow 2
Week 7 Mutation
Week 8 Natural selection 1
Week 9 Natural selection 2 (Midterm exam due)
Week 10 Molecular evolution 1
Week 11 Molecular evolution 2
Week 12 Clades/Trees
Week 13 Sexual selection
Week 14 Cooperation and conflict
Week 15 Speciation
Week 16 Evo-devo
Week 17 Co-evolution
Week 18 Final exam/"Grant reading committee"

**教學方法 Lecturing Methodologies**

| **方式 Methods** | **說明 Notes** |
|---|---|
| ■講述法 Formal lectures | Lectures occur for some of the classes and is generally minimal. |
| ■討論法 Group discussion | Students must discuss reading material from text book and primary literature as well as homework problems |
| ■問題解決教學 Problem-based learning | Students must complete weekly problem sets |
| □合作學習 Cooperative learning | |
| □實驗/實作 Lab/Hands-On | |
| □實地考察、參訪 Field work | |
| □媒體融入教學 Media, audio, visual materials | |
| ■專題研究 Project/Case studies | Midterm is refereeing a paper; final is grant proposal |
| □其他：Other: | (please enter any methods applied not included above) |

**評量方法 Assessment Methodologies**

| **方式 Methods** | **百分比** | **說明** Notes |
|---|---|---|

| | Percentage | |
|---|---|---|
| ■作業 Assignments | 30 | 1-1 |
| ■期中考 Midterm Exam | 15 | 3-1 and 1-1 |
| ■期末考 Final exam | 25 | 3-1 and 1-1 |
| ■課堂討論參與 Class participation | 30 | 1-1 |
| ■出席 Attendance | -0- | included in class participation |
| □報告 Report/Presentations | | |
| □成果展覽 Demos/ Exhibitions | | |
| ■專題 Project/Case study reports | -0- | included as final exam |
| □其他：other: | | (please enter any methods applied not included above) |
| **參考書目 Textbooks and References** | Population Genetics, Matthew B. Hamilton (Wiley-Blackwell, 2009)<br>Evolution 2nd Edition, Douglas J. Futuyma (Sinauer Associates, Inc, 2009) | |

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**一、課程基本資料**（任課教師不可異動部分，同一課程名稱此部分應相同）
**I.Course information** (maintained by Information Technology Center)

| | | | | |
|---|---|---|---|---|
| **課程代碼 Course Number** | DIC8027 | **課程名稱** Title in Chinese | 實驗室輪調學習 | |
| **英文名稱 Title in English** | Lab Rotations | | | |
| **全/半年 Two/one semester** | One semester | | **必/選修** Required/ Elective | Required |
| **學分數 Credits** | 1 | | **每週授課時數** Lecture hours per week | 1 |
| **開課系級 Eligible Class standing** | BIODIV Program | | | |
| **先修課程 Prerequisites** | No | | | |
| **課程簡介 Course Description** | This course is designed to expose students to a variety of labs in biodiversity, and provide students with basic knowledge of different types of labs. | | | |

**核心能力(Core competences)**

1-1■ 具備探究生命科學之專業知識
To have the professional knowledge required for designing and conducting research in life sciences.

2-1■ 能運用相關科技並精熟儀器操作，以多元方法進行獨立研究，解決生命科學問題
To be able to apply modern techniques to solve diverse scientific questions in life sciences.

3-1□ 具備針對實驗結果，進行正確分析、歸納並發表研究成果的能力
To be able to analyze experimental data rigorously, draw appropriate conclusions and publish results in scientific journals.

4-1□ 具備正確的科學態度，瞭解遵守科學倫理之重要性
To have a proper attitude toward scientific research and to adhere to scientific ethical standards.

5-1□ 能欣賞生物之美，體認生命科學對人類生存及地球永續發展之重要性。
To appreciate the beauty of life and to recognize the importance of life science to the survival of humanity and the sustainability of our planet.

| **課程目標 Course Objectives** | | **對應系所核心能力 Corresponding Departmental Core Competences** |
|---|---|---|
| 1 | Expose students to various research topics in biodiversity | 1-1,2-1 |

**二、教學大綱**（任課教師可異動部分）
**II. General Syllabus** (maintained by instructors each semester)

| | |
|---|---|
| **授課教師 Instructor(s)** | All Faculty Members |
| **教學進度與主題**（可說明每週進度）**Schedule** | |

| | | |
|---|---|---|
| Week 1: Course introduction<br>Week 2: Lab introductions<br>Week 3: Lab introductions<br>Week 4: Lab introductions<br>Week 5: Lab experiments<br>Week 6: Lab experiments<br>Week 7: Lab experiments<br>Week 8: Lab experiments<br>Week 9: Lab experiments<br>Week 10: Lab experiments<br>Week 11: Lab experiments<br>Week 12: Lab experiments<br>Week 13: Lab experiments<br>Week 14: Lab experiments<br>Week 15: Lab experiments<br>Week 16: Lab experiments<br>Week 17: Lab experiments<br>Week 18: Lab experiments | | |
| **教學方法 Lecturing Methodologies** | | |
| **方式 Methods** | **說明 Notes** | |
| □講述法 Formal lectures | | |
| ■討論法 Group discussion | Q&A | |
| □問題解決教學<br>Problem-based learning | | |
| □合作學習<br>Cooperative learning | | |
| ■實驗/實作 Lab/Hands-On | Student participate in experiments | |
| ■實地考察、參訪<br>Field work | Student visit labs | |
| □媒體融入教學<br>Media, audio, visual materials | | |
| □專題研究<br>Project/Case studies | | |
| □其他：Other: | (please enter any methods applied not included above) | |
| **評量方法 Assessment Methodologies** | | |
| **方式 Methods** | **百分比** Percentage | **說明** Notes |
| □作業 Assignments | | |
| □期中考 Midterm Exam | | |
| □期末考 Final exam | | |
| □課堂討論參與 Class participation | | |
| ■出席 Attendance | 50 | 2-1 |
| □報告 Report/Presentations | | |
| □成果展覽<br>Demos/ Exhibitions | | |
| ■專題<br>Project/Case study reports | 50 | 1-1 |
| □其他：other: | | (please enter any methods applied not included above) |
| **參考書目**<br>**Textbooks and References** | No | |