



## 教學計劃表 Syllabus

|  |   |                             |                                 |                                    |   |
|--|---|-----------------------------|---------------------------------|------------------------------------|---|
| 課程名稱(中文)<br>Course Name in Chinese   | 水棲昆蟲生態學   |                             | 學年/學期<br>Academic Year/Semester | 113/1                              |   |
| 課程名稱(英文)<br>Course Name in English   | Ecology of Aquatic Insect   |                             |                                 |                                    |   |
| 科目代碼<br>Course Code  | NRES53000   | 系級<br>Department & Year     | 碩士                              | 開課單位<br>Course-Offering Department | 自然資源與環境學系   |
| 修別<br>Type   | 選修 Elective   | 學分數/時間<br>Credit(s)/Hour(s) | 3.0/3.0                         |                                    |   |
| 授課教師<br>Instructor   | /黃國靖  |                             |                                 |                                    |   |
| 先修課程<br>Prerequisite   |   |                             |                                 |                                    |   |
| 課程描述 Course Description  |   |                             |                                 |                                    |   |
| <p>本課程主要探討水棲昆蟲與淡水域環境間生物及生態上之相互作用及觀念，進而認知水棲昆蟲在淡水域中之重要性。(認識淡水生態系中最為常見且極為重要之大型無脊椎動物水棲昆蟲，包括外部型態與結構、各種採樣方法與技術、水棲昆蟲顯微觀察及影像處理、水棲昆蟲飼養及生活史建立、水棲昆蟲相關生態主題探討、水棲昆蟲應用研究等。藉以建立水棲昆蟲在分類、生態、生物學等領域中之相關認知及研究能力。</p> |   |                             |                                 |                                    |   |
| 課程目標 Course Objectives   |   |                             |                                 |                                    |   |
| <p>認識淡水生態系中最為常見且極為重要之大型無脊椎動物水棲昆蟲，包括外部型態與結構、各種採樣方法與技術、水棲昆蟲顯微觀察及影像處理、水棲昆蟲飼養及生活史建立、水棲昆蟲相關生態主題探討、水棲昆蟲應用研究等。藉以建立水棲昆蟲在分類、生態、生物學等領域中之相關認知及研究能力。</p>   |   |                             |                                 |                                    |   |
| 系專業能力<br>Basic Learning Outcomes   |   |                             |                                 |                                    | 課程目標與系專業能力相關性<br>Correlation between Course Objectives and Dept.'s Education Objectives |
| A  | 能覺知多元的自然科學與社會科學理論並具備研究能力<br>To have knowledge of natural and social science theories  |                             |                                 |                                    | ●   |
| B  | 具備自然資源與人類社會議題之調查分析、規劃與經營之能力<br>To be able to investigate, analyze, plan, and manage both natural resource and human social issues                     |                             |                                 |                                    | ●   |
| C  | 具備將環境倫理與生態思想落實於永續性生活型態的能力<br>To implement sustainable lifestyles based on environmental ethics and ecological principles                              |                             |                                 |                                    | ●   |
| D  | 能以整全式的觀點來解析環境問題，並具備發展系統性解決方案的能力<br>To resolve environmental issues and develop systematic solutions with a global perspective                         |                             |                                 |                                    | ●   |
| E  | 具備系統分析、未來思考、溝通協調與團隊合作的能力<br>The ability to analyze, plan, communicate, and coordinate with others (teamwork)  |                             |                                 |                                    | ●   |
| F  | 具備終身學習、國際視野與外語溝通的能力<br>To instill the values of lifelong learning, an international perspective, and the ability to communicate in a foreign language |                             |                                 |                                    | ○   |
| 圖示說明 Illustration : ● 高度相關 Highly correlated ○ 中度相關 Moderately correlated  |   |                             |                                 |                                    |   |
| 授課進度表 Teaching Schedule & Content  |   |                             |                                 |                                    |   |
| 週次 Week  | 內容 Subject/Topics   |                             |                                 |                                    | 備註 Remarks  |
| 1  | Introduction, Course outline and requirements, Questionnaire  |                             |                                 |                                    |   |
| 2  | Properties of lotic aquatic habitats  |                             |                                 |                                    |   |
| 3  | Properties of lentic aquatic habitats<br>Respiratory adaptations and osmoregulation   |                             |                                 |                                    |   |

|    |  |  |
|----|--|--|
| 4  | Evolution, biogeography and aquatic distribution |  |
| 5  | Holiday (Double Ten day)                         |  |
| 6  | Functional vs taxonomic groups                   |  |
| 7  | Ephemeroptera, Plecoptera                        |  |
| 8  | Trichoptera                                      |  |
| 9  | Megaloptera, Neuroptera                          |  |
| 10 | Collembola, Orthoptera, Hemiptera                |  |
| 11 | Odonata, Coleoptera                              |  |
| 12 | Diptera  |  |
| 13 | Aquatic habitats: chemical conditions            |  |
| 14 | Aquatic habitats: physical conditions            |  |
| 15 | Water quality: biotic index                      |  |
| 16 | Natural disturbance and aquatic insects          |  |
| 17 | Human disturbance and aquatic insects            |  |
| 18 | 期末考試週 Final Exam                                 |  |

教學策略 Teaching Strategies

- 課堂講授 Lecture                       分組討論 Group Discussion                       參觀實習 Field Trip  
 其他 Miscellaneous:

教學創新自評 Teaching Self-Evaluation

創新教學 (Innovative Teaching)

- 問題導向學習 (PBL)                       團體合作學習 (TBL)                       解決導向學習 (SBL)  
 翻轉教室 Flipped Classroom                       磨課師 Moocs

社會責任 (Social Responsibility)

- 在地實踐 Community Practice                       產學合作 Industry-Academia Cooperation

跨域合作 (Transdisciplinary Projects)

- 跨界教學 Transdisciplinary Teaching                       跨院系教學 Inter-collegiate Teaching

- 業師合授 Courses Co-taught with Industry Practitioners

其它 other:

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學期成績計算及多元評量方式 Grading & Assessments

| 配分項目<br>Items                       | 配分比例<br>Percentage | 多元評量方式 Assessments |          |          |          |          |          |          |    |
|-------------------------------------|--------------------|--------------------|----------|----------|----------|----------|----------|----------|----|
|                                     |                    | 測驗<br>會考           | 實作<br>觀察 | 口頭<br>發表 | 專題<br>研究 | 創作<br>展演 | 卷宗<br>評量 | 證照<br>檢定 | 其他 |
| 平時成績 General<br>Performance         | 30%                |                    | ✓        | ✓        |          |          |          |          |    |
| 期中考成績 Midterm Exam                  | 20%                | ✓                  |          |          |          |          |          |          |    |
| 期末考成績 Final Exam                    | 20%                | ✓                  |          |          |          |          |          |          |    |
| 作業成績 Homework and/or<br>Assignments | 30%                |                    | ✓        | ✓        | ✓        |          |          |          |    |
| 其他 Miscellaneous<br>(_____)         |                    |                    |          |          |          |          |          |          |    |

評量方式補充說明

Grading & Assessments Supplemental instructions

教科書與參考書目 (書名、作者、書局、代理商、說明)

Textbook & Other References (Title, Author, Publisher, Agents, Remarks, etc.)

- Allan, J.D. 2004. Stream Ecology: Structure and function of running waters. Chapman & Hall Published. London. 388 pp.
- Hauer, F.R. and G.A. Lamberti. 2007. Methods in stream ecology. (2nd ed.) Academic Press, San Diego, CA. 896pp.
- Lancaster, J. and B.J. Downes. 2013. Aquatic entomology. Oxford University Press, OX. 285pp.
- Merritt, R. W., K.W. Cummins and M.B. Berg. 2008. An introduction to the aquatic insects of North America (4th ed.). Kendall Hunt Publishing Co., Debuque, IA. 1158pp.

課程教材網址(含線上教學資訊, 教師個人網址請列位於本校內之網址)

Teaching Aids & Teacher's Website(Including online teaching information.  
Personal website can be listed here.)

水棲昆蟲生態學線上教學網址如下:

<https://meet.google.com/upg-awgt-uvr>

其他補充說明 (Supplemental instructions)