



## 教學計畫表 Syllabus

|                                    |                                                                                                                                |                              |    |                                       |               |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|------------------------------|----|---------------------------------------|---------------|
| 課程名稱(中文)<br>Course Name in Chinese | 國小自然科學實驗研究 特論                                                                                                                  |                              |    | 學年/學期<br>Academic Year/Semester       | 112/2         |
| 課程名稱(英文)<br>Course Name in English | Study of Elementary Science Experiment                                                                                         |                              |    | 授課教師<br>Instructor                    | 鄭立婷           |
| 科目代碼<br>Course Code                | SCE_71840                                                                                                                      | 系級<br>Department<br>& Year   | 博士 | 開課單位<br>Course-Offering<br>Department | 教育與潛能<br>開發學系 |
| 修別<br>Type                         | <input type="checkbox"/> 必修 Required<br><input checked="" type="checkbox"/> 選修 Elective<br><input type="checkbox"/> 學程 Program | 學分數/時數<br>Credit(s)/ Hour(s) |    | 3                                     |               |
| 先修課程<br>Prerequisite               |                                                                                                                                |                              |    |                                       |               |
| 課程描述<br>Course Description         | 在 108 課綱架構下，培養國小師資在實驗教學上的知識、能力與態度，並進一步深入理解各類科學實驗之目的與原理，俾能引導學生瞭解經由實驗實踐探究與實作之義涵和素養，同時培養個人在實驗相關研究與進階發展上的知能。                       |                              |    |                                       |               |

|                                                                                           |                                                                                                                                                                               |   |   |   |  |            |
|-------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|--|------------|
| 課程目標<br>Course Objectives                                                                 | <ul style="list-style-type: none"> <li>●認識科學實驗特性與內涵，探討國小階段實驗活動之原理。</li> <li>●實際操作科學實驗，深化對實驗技能知能之瞭解。</li> <li>●評析科學實驗目的、原理與實作之適用性與延展性。</li> <li>●具備科學教師指導學生實驗的基本知能。</li> </ul> |   |   |   |  |            |
| 系專業能力<br>Basic Learning Outcomes                                                          | A. 具備教育專業以解決教育實務問題的知能。<br>B. 具備系統思考與設計潛能開發方案的素養。<br>C. 具備覺察教育問題並應用探究素養的知能。<br>D. 具備結合閱讀教學與數位科技的知能。                                                                            |   |   |   |  |            |
| 課程目標與系專業能力<br>相關性 Correlation between<br>Course Objectives and Basic<br>Learning Outcomes | A                                                                                                                                                                             | B | C | D |  |            |
|                                                                                           |                                                                                                                                                                               | ● | ○ | ● |  |            |
| 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<br>week                                                                                | 內容 (Subject/Topics)                                                                                                                                                           |   |   |   |  | 備註 Remarks |

| 1                                                                                                                                                                                                                                                                                     | 課程介紹、實驗類型與安全                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 2/22               |            |                 |                    |      |      |      |    |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------------|-----------------|--------------------|------|------|------|----|--|--|--|-------|-------|------|------|------|------|------|----|-----------------------------|--|--|--|---|--|--|--|--|---|-----------------------|--|--|--|--|--|--|--|--|--|---------------------|--|--|--|--|---|--|--|--|--|-------------------------------------|--|--|---|--|--|--|--|--|---|----------------------------|--|--|---|---|---|--|--|--|--|
| 2                                                                                                                                                                                                                                                                                     | 科學觀察、測量、描繪與寫作                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2/29               |            |                 |                    |      |      |      |    |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
| 3                                                                                                                                                                                                                                                                                     | 學習表現與實驗能力                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 3/7                |            |                 |                    |      |      |      |    |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
| 4                                                                                                                                                                                                                                                                                     | 3 年級的實驗：植物的分類                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 3/14               |            |                 |                    |      |      |      |    |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
| 5                                                                                                                                                                                                                                                                                     | 3 年級的實驗：溶解                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 3/21               |            |                 |                    |      |      |      |    |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
| 6                                                                                                                                                                                                                                                                                     | 3 年級的實驗：浮力                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 3/28               |            |                 |                    |      |      |      |    |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
| 7                                                                                                                                                                                                                                                                                     | (春假)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 4/5                |            |                 |                    |      |      |      |    |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
| 8                                                                                                                                                                                                                                                                                     | 期中考                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 4/12               |            |                 |                    |      |      |      |    |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
| 9                                                                                                                                                                                                                                                                                     | 4 年級的實驗：月相儀                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 4/18               |            |                 |                    |      |      |      |    |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
| 10                                                                                                                                                                                                                                                                                    | 4 年級的實驗：時間的測量                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 4/25               |            |                 |                    |      |      |      |    |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
| 11                                                                                                                                                                                                                                                                                    | 4 年級的實驗：電路                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 5/2                |            |                 |                    |      |      |      |    |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
| 12                                                                                                                                                                                                                                                                                    | 5 年級的實驗：空氣與燃燒                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 5/9                |            |                 |                    |      |      |      |    |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
| 13                                                                                                                                                                                                                                                                                    | 5 年級的實驗：聲音                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 5/16               |            |                 |                    |      |      |      |    |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
| 14                                                                                                                                                                                                                                                                                    | 5 年級的實驗：酸與鹼                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 5/23               |            |                 |                    |      |      |      |    |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
| 15                                                                                                                                                                                                                                                                                    | 6 年級的實驗：熱對物質的影響                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 5/30               |            |                 |                    |      |      |      |    |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
| 16                                                                                                                                                                                                                                                                                    | 6 年級的實驗：簡單機械                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 6/6                |            |                 |                    |      |      |      |    |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
| 17                                                                                                                                                                                                                                                                                    | 6 年級的實驗：防鏽與防腐                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 6/13               |            |                 |                    |      |      |      |    |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
| 18                                                                                                                                                                                                                                                                                    | 期末考                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 6/20               |            |                 |                    |      |      |      |    |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
| 教學策略<br>Teaching Strategies                                                                                                                                                                                                                                                           | <input checked="" type="checkbox"/> 課堂講授 Lecture <input checked="" type="checkbox"/> 分組討論 Group Discussion <input type="checkbox"/> 參觀實習 Field Trip<br><input checked="" type="checkbox"/> 其他 Miscellaneous:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                    |            |                 |                    |      |      |      |    |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
| 學期成績計算及多元評量方式<br>Grading & assessments                                                                                                                                                                                                                                                | <table border="1"> <thead> <tr> <th rowspan="2">配分項目 Items</th> <th rowspan="2">配分比例 Percentage</th> <th colspan="8">多元評量方式 assessments</th> </tr> <tr> <th>測驗/會考</th> <th>實作/觀察</th> <th>口頭發表</th> <th>專題研究</th> <th>創作展演</th> <th>卷宗評量</th> <th>證照檢定</th> <th>其他</th> </tr> </thead> <tbody> <tr> <td>平時成績<br/>General Performance</td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>期中考成績<br/>Midterm Exam</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>期末考成績<br/>Final Exam</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>作業成績<br/>Homework and/or Assignments</td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>其他 Miscellaneous<br/>(教學演示)</td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> |                    | 配分項目 Items | 配分比例 Percentage | 多元評量方式 assessments |      |      |      |    |  |  |  | 測驗/會考 | 實作/觀察 | 口頭發表 | 專題研究 | 創作展演 | 卷宗評量 | 證照檢定 | 其他 | 平時成績<br>General Performance |  |  |  | ✓ |  |  |  |  | ✓ | 期中考成績<br>Midterm Exam |  |  |  |  |  |  |  |  |  | 期末考成績<br>Final Exam |  |  |  |  | ✓ |  |  |  |  | 作業成績<br>Homework and/or Assignments |  |  | ✓ |  |  |  |  |  | ✓ | 其他 Miscellaneous<br>(教學演示) |  |  | ✓ | ✓ | ✓ |  |  |  |  |
| 配分項目 Items                                                                                                                                                                                                                                                                            | 配分比例 Percentage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 多元評量方式 assessments |            |                 |                    |      |      |      |    |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
|                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 測驗/會考              | 實作/觀察      | 口頭發表            | 專題研究               | 創作展演 | 卷宗評量 | 證照檢定 | 其他 |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
| 平時成績<br>General Performance                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |            | ✓               |                    |      |      |      | ✓  |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
| 期中考成績<br>Midterm Exam                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |            |                 |                    |      |      |      |    |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
| 期末考成績<br>Final Exam                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |            |                 | ✓                  |      |      |      |    |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
| 作業成績<br>Homework and/or Assignments                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    | ✓          |                 |                    |      |      |      | ✓  |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
| 其他 Miscellaneous<br>(教學演示)                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    | ✓          | ✓               | ✓                  |      |      |      |    |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
| 教科書與參考書目 (書名、作者、書局、代理商、說明)<br>Textbook & Other References (Title, Author, Publisher, Agents, Remarks, etc.)                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |            |                 |                    |      |      |      |    |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |
| 課程教材網址 (教師個人網址請列在本校內之網址)<br>Teaching Aids & Teacher's Website (Personal website can be listed here.)<br><br><a href="https://cirn.moe.edu.tw/Module/WebFileVideo/index.aspx?sid=1225&amp;mid=16659">https://cirn.moe.edu.tw/Module/WebFileVideo/index.aspx?sid=1225&amp;mid=16659</a> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |            |                 |                    |      |      |      |    |  |  |  |       |       |      |      |      |      |      |    |                             |  |  |  |   |  |  |  |  |   |                       |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |   |  |  |  |  |                                     |  |  |   |  |  |  |  |  |   |                            |  |  |   |   |   |  |  |  |  |