STEAM Education in Early Years
Syllabus

- Lecturer: Ching-Ting Hsin/ Associate Professor
  Email:cthsin@gapp.nthu.edu.tw
- Time: Wednesday 56 (13:20-15:10)
- Classroom: 2106, Nanda Campus

- Class description

The purposes of this class are to help students to understand inquiry-based STEM activities and projects for young children and the ways to improve and assess young children's inquiry ability. Three approaches are introduced: (1) theme-based STEM activities, (2) project-based STEM curriculum, (3) culturally integrated STEM curriculum, and (4) conceptual play STEM curriculum. Students will use their knowledge and skills that they learn in this class to develop lesson plans and guide kindergartens to conduct STEM activities. Students will also develop STEM projects.

<table>
<tr><td>師培專業素養指標</td><td>3.規劃適切的課程、教學及多元評量<br>3-2 依據課程綱要/大綱、課程理論及教學原理，以協同發展跨領域/群科/科目課程、教學及評量。<br>3-3 具備任教領域/群科/科目所需的專門知識與學科教學知能， 以進行教學。<br>5.認同並實踐教師專業倫理<br>5-3 透過教育實踐與省思，以發展溝通、團隊合作、問題解決及持續專業成長的意願與能力。</td></tr>
<tr><td>師培課程核心內容</td><td>3-(4)幼兒園領域專門知識與教學知能<br>5-(1)教師自我省思、溝通互動與解決問題</td></tr>
<tr><td>融入議題</td><td>● 十二年國教 19 項議題融入(系辦最後檢視是否全部議題都有課程勾選)
<table>
<tr><td></td><td>性別平等教育</td><td></td><td>生命教育</td><td></td><td>能源教育</td><td></td><td>多元文化教育</td></tr>
<tr><td></td><td>人權教育</td><td></td><td>法治教育</td><td></td><td>安全教育</td><td></td><td>閱讀素養</td></tr>
<tr><td></td><td>環境教育</td><td></td><td>科技教育</td><td></td><td>防災教育</td><td></td><td>戶外教育</td></tr>
<tr><td></td><td>海洋教育</td><td></td><td>資訊教育</td><td></td><td>家庭教育</td><td></td><td>國際教育</td></tr>
<tr><td></td><td>品德教育</td><td></td><td>(含數位學習)</td><td></td><td>生涯規劃教育</td><td>■</td><td>原住民族教育</td></tr>
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● 新興議題
<table>
<tr><td>■</td><td>媒體識讀</td><td></td><td>通用設計</td><td></td><td>修復式正義</td><td></td><td></td></tr>
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- Weekly schedule

| week | Date | Topic | Reading/assignments |
|---|---|---|---|
| 1 | 9/16 | Introduction and grouping | |
| 2 | 9/23 | Introduction to STEM Education: Content of STEM<br>STEM activities (Taiwan and Tailand) | Moomaw C1<br>handouts<br>video clips & PPT |
| 3 | 9/30 | Effective teaching: Inquiry cycle and teaching strategies<br>Science and engineering practices<br>Guideline for ECE and care in Taiwan: cognitive domain | Moomaw C1<br>Gelman et al C3<br>handouts |
| 4 | 10/7 | STEM activities for learning centers | Moomaw C2<br>Presentation 1 |
| 5 | 10/14 | Haus der Kleinen Forscher (Little Scientists' House) Program- the theme of technology: forces and effects | Handouts<br>Presentation 2 |
| 6 | 10/21 | Haus der Kleinen Forscher (Little Scientists' House) Program: the theme of water | handouts |
| 7 | 10/28 | Expert talk: Robots | |
| 8 | 11/4 | Computational thinking | handouts |
| 9 | 11/11 | university sports day | Turn in refection of the talk |
| 10 | 11/18 | Design and prepare for teaching STEM in a kindergarten: develop lesson plans | |
| 11 | 11/25 | Design and prepare for teaching STEM in a kindergarten: rehearsal and revised lesson plans | |
| 12 | 12/2 | Teaching a STEM activity in a kindergarten | |
| 13 | 12/9 | Driving questions for investigation<br>Project approach: airplane and spinning tops | Krajcik & Czerniak, C3<br>Helm & Katz, C1 C9<br>Turn in lesson plan and reflection |
| 14 | 12/16 | Example of projects: ice, tree, movie<br>Conceptual play STEM curriculum | Moomaw C5<br>Handout<br>Presentation 3 |

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| 15 | 12/23 | Culturally integrated STEM projects<br>Giwas love science<br>Indigenous STEM projects | Video clips |
| 16 | 12/30 | Development of STEM projects | |
| 17 | 1/6 | Share and demonstrate STEM projects | |
| 18 | 1/13 | Review of the class | Turn in the STEM project |

- Teaching methods

Lectures, small group discussion, classroom activities, teaching STEM in a kindergarten, presentations of STEAM projects

- Assignments and evaluation

1. STEM activity and project presentations (20%)
   Choose one of the three presentations, 10/7 10/14 12/16
2. Reflection of the talk (20%)
   Group work, 1 page, single space, due 11/11
3. Lesson plans and reflection of a STEM activity (20%)
   Group work, 1-2 pages, single space, due 12/9
4. The web of concepts and activities of the STEM project (30%)
   Group work, 4-5 pages, single space, due 1/13
5. Attendance and participation in classroom activities (10%)

- Readings

1. Gelman, R., Brenneman, K., Macdonald, G., & Román, M. (2010). Preschool pathways to science (PrePS): *Facilitating scientific ways of thinking, talking, doing, and understanding*. Paul H. Brookes Publishing.
2. Haus der Kleinen Forscher (Little Scientists' House) Program
3. Helm, J. H., & Katz, L. G. (2016). *Young investigators: The project approach in the early years* (3rd ed.). New York: Teachers College, Columbia University.
4. Krajcik, J. S., & Czerniak, C. M. (2007). *Teaching children science in elementary and middle school: A project-based approach*. Routledge
5. Moomaw, S. (2013). *Teaching STEM in the early years: Activities for integrating science, technology, engineering, and mathematics*. Redleaf Press.
6. ppt and handouts