

國立清華大學 112 學年第 1 學期新開課程課程大綱

| | | | | | |
|------------------------------|-------------------------------------|--------------|---|--------------------|--|
| 科號 Course Number | | 學分 Credit | 2 | 人數限制 Class Size | |
| 中文名稱 Course Title | 新興生命科學研究方法 | | | | |
| 英文名稱 Course English Title | Method to watch: Nature Methods | | | | |
| 任課教師 Instructor | 王慧菁/林珮君/謝琬甄/李以如/林郁婷/周雅菁/ 陳韋靜/廖品超 | | | | |
| 上課時間 Time | R6R7 | 上課教室 Room | | | |

課程簡述(必填)(最多 500 個中文字) 本欄位資料會上傳教育部課程網

Brief Course Description (required) (50-200 words if possible, up to 1000 letters)

本課程主要講授發表在 *Nature Methods* 期刊中的新興醫學及生命科學研究方法，並探討這些技術的未來應用。

This lecture will be given in English.

The lectures will focus on introducing select key methodologies published in the prestigious journal *Nature Methods*, as well as discussing their potential future implications. The teachers will introduce 17 different method topics and the lecture will be given in a hybrid mode (physical + online).

請輸入課程內容「中文暨英文關鍵字」至少 5 個，每個關鍵字至多 20 個中文，以半形逗點分隔 (必填)

Please fill in at least 5 course keywords (up to 40 letters for each keyword) and use commas to separate them.(required)

Nature Methods, Biotechnology, Molecular Biology, Cell Biology, Immunology, Genetics, Neuroscience

| | |
|--------|---|
| 一、課程說明 | <p>Nature Methods is a monthly journal publishing novel methods and significant improvements to basic life sciences research techniques. The journal is aimed at a broad, interdisciplinary audience of academic and industry researchers actively involved in laboratory practice. It provides researchers with new tools to conduct their research and places a strong emphasis on immediate practical relevance and potential to advance new biological applications.</p> <p>We noted that each paper published in Nature Methods must be accompanied by strong validation, an application to an important biological question and results illustrating its performance in</p> |
|--------|---|

| | | | comparison to available approaches. Thus, papers are selected for publication based on broad interest, thorough assessments of methodological performance and comprehensive technical descriptions that facilitate immediate application. Accordingly, we believe our students may benefit a lot by learning these new methods. |
|--------|-------|----------------|--|
| 二、指定用書 | | | <p>Nature methods</p> <p>The electronic international standard serial number (EISSN) is 1548-7105.</p> <p>https://www.nature.com/nmeth/</p> <p>https://www.nature.com/nmeth/articles?type=method-to-watch</p> |
| 三、參考書籍 | | | |
| 四、教學方式 | | | Each lecture will consist of two parts. The first part will feature lectures given by individual teachers, while the second part will involve student presentations and discussions guided by the teachers |
| 五、教學進度 | | | Please see the following table. |
| Week | Date | Teacher | Topic |
| 1 | 09/14 | Lily Wang | <p>General lecture introduction</p> <p>Topic-1: Method to watch 2022: Imaging without the labels https://www.nature.com/articles/s41592-021-01376-0</p> <p>Topic-2: Organic dyes for live imaging https://www.nature.com/articles/s41592-020-01032-z</p> |
| 2 | 09/21 | Wei-Ching Chen | <p>Topic-3: Method to watch 2020: Tools for metabolomics http://www.nature.com/articles/s41592-019-0710-6</p> <p>Topic-4: Method to watch 2023: Annotating unknown metabolites http://www.nature.com/articles/s41592-022-01735-5</p> |
| 3 | 09/28 | Teacher's day | |
| 4 | 10/05 | Pei-Chun Lin | <p>Topic-5: ClampFISH Nat Methods 19, 1403–1410 (2022). https://doi.org/10.1038/s41592-022-01653-6</p> <p>Student presentation</p> |
| 5 | 10/12 | Ya-Ching Chou | <p>Topic-6: Joint profiling of DNA methylation and chromatin architecture in single cells https://www.nature.com/articles/s41592-019-0502-z</p> <p>Student presentation</p> |
| 6 | 10/19 | I-Ju Lee | <p>Topic-7: Next-Generation Expansion Microscopy https://www.nature.com/articles/s41592-023-01793-3 and related articles</p> <p>Student presentation</p> |
| 7 | 10/26 | Yu-Ting Lin | <p>Topic-8: Controlling cellular activities with light Nat Methods 20, 357–358 (2023) https://www.nature.com/articles/s41592-022-01745-3</p> |

| | | | | |
|------------------|-------|--|--|--|
| | | | Student presentation | |
| 8 | 11/02 | Pei-Chun Lin | Topic-9: Cryo-electron tomography Nat Methods (2023). https://doi.org/10.1038/s41592-023-01783-5 | |
| | | | Student presentation | |
| 9 | 11/09 | I-Ju Lee | Topic-10: Methods to watch 2023: A light switch for targeted genomics https://www.nature.com/articles/s41592-022-01733-7 | |
| | | | Student presentation | |
| 10 | 11/16 | Ya-Ching Chou | Topic-11: SpaGCN: Integrating gene expression, spatial location and histology to identify spatial domains and spatially variable genes by graph convolutional network https://www.nature.com/articles/s41592-021-01255-8 | |
| | | | Student presentation | |
| 11 | 11/23 | Lily Wang | Topic-12: Neuroscience goes viral https://www.nature.com/articles/s41592-021-01373-3 | |
| | | | Student presentation | |
| 12 | 11/30 | Wan-Chen Hsieh | Topic-13: T cell development in a dish Nature Methods volume 18, page 35 (2021) https://www.nature.com/articles/s41592-020-01047-6 | |
| | | | Student presentation | |
| 13 | 12/07 | Yu-Ting Lin | Topic-14: Patch-seq technique Nat Methods 19, 1340–1344 (2022) https://www.nature.com/articles/s41592-022-01662-5 | |
| | | | Student presentation | |
| 14 | 12/14 | Wan-Chen Hsieh | Topic-15: Macrophages enter CAR immunotherapy Nature Methods volume 17, page 561 (2020) https://www.nature.com/articles/s41592-020-0862-4 | |
| | | | Student presentation | |
| 15 | 12/21 | Pin-Chao Liao | Topic-16: Automated segmentation and tracking of mitochondria in live-cell time-lapse images Nature Methods volume 18, pages 1091–1102 (2021) https://www.nature.com/articles/s41592-021-01234-z | |
| | | | Student presentation | |
| 16 | 12/28 | Pin-Chao Liao | Topic-17: Actin chromobody imaging reveals sub-organellar actin dynamics Nature Methods volume 17, pages 917–921 (2020) https://www.nature.com/articles/s41592-020-0926-5 | |
| | | | Student presentation | |
| 六、成績考核 | | Course participation: 20% Presentation: 80% (40% classmates, 40% teacher) | | |
| 七、可連結之網頁位址(相關網頁) | | https://www.nature.com/nmeth/ https://www.nature.com/nmeth/articles?type=method-to-watch | | |