

## TIGP Bioinformatics Program 2024 Spring Syllabus

### Advanced Algorithms (C2)

For the latest syllabus, please visit the BP website: <https://idv.sinica.edu.tw/tigpbio/>

<b>Place:</b> Room 308, Institute of Statistical Science, Academia Sinica <b>Time:</b> Friday 14:00-17:00 <b>Chair:</b> Dr. Chien-Yu Chen (chienyuchen@ntu.edu.tw) <b>Outline:</b> This course is basically about data mining, machine learning and statistical modeling from data, and some other algorithms and applications.
<b>Resources:</b> There are 8 topics given in the way of <b>Videos Preview</b> (about 2~3 hours) + <b>In-class discussions</b> (about 1~1.5 hours). Please find the link ( <a href="https://bit.ly/41vGP3G">https://bit.ly/41vGP3G</a> ) that WILL provide the links of the following: (1) the videos to be watched BEFORE the class (2) the questions to be discussed IN the class (3) the homework to be completed AFTER the class
<b>References:</b> 1. Learning from Data- A Short Course (Abu-Mostafa, Magdon-Ismael, Lin, 2012) 2. Learning Pattern Classification (Duda, Harg, and Stork, 2001) 3. An Introduction to Support Vector Machines and Other Kernel-based Learning Methods (Cristianini and Shawe-Taylor, 2000) 4. [DL in Life Science] <a href="https://mit6874.github.io/">https://mit6874.github.io/</a> 5. [ML for Genomics] <a href="https://www.classcentral.com/course/youtube-6-047-6-878-machine-learning-for-genomics-fall-2020-48203">https://www.classcentral.com/course/youtube-6-047-6-878-machine-learning-for-genomics-fall-2020-48203</a> <b>TA:</b> Daniel Garcia-Ruiz <b>Email:</b> gard_ruiz@hotmail.com <b>Office hours:</b> Thursdays 12:00 ~14:00 pm <b>Office location:</b> <a href="https://meet.google.com/did-zxfu-iyf?pli=1">https://meet.google.com/did-zxfu-iyf?pli=1</a> <b>Grades:</b> Midterm exam 50%. Final exam 50%.

#### 【 For Non-BP student 】

For Non-BP student to register/sit-in any BP course, it is required to gain course chair's permission: (1) Basic Enrollment Information form <a href="https://forms.gle/oK7vJzrx9EvybbT9">https://forms.gle/oK7vJzrx9EvybbT9</a> (2) TIGP-BP Course Registration Consent Form <a href="https://idv.sinica.edu.tw/tigpbio/index/TIGP%20Bioinformatics_Class%20Registration%20Consent%20Form.docx">https://idv.sinica.edu.tw/tigpbio/index/TIGP%20Bioinformatics_Class%20Registration%20Consent%20Form.docx</a> ※ Deadline: <b>the 4th week</b> of each semester. ※ Signature of the course chair should be collected before submission. Incomplete form will not be accepted. ※ Course grade will NOT be given (even class enrollment is completed at school) if fail to follow the above procedures.
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Week	Date	Topics/Brief Description	Lecturers	Lecture Style	Evaluation Method	Email
1	2024/2/23	Data Classification	Dr. Li Su	Lectures	HW with a specified deadline ▶ April 12th	lisu@iis.sinica.edu.tw
2	<a href="#">2024/3/1</a> <a href="#">@Webex Only</a>	Boolean and Bayesian networks	Dr. Horng-Shing Lu	Online Lectures	HW with a specified deadline: ▶ April 12th	henryhslu@nycu.edu.tw
3	2024/3/8	Hidden Markov Models	Dr. Yu Tsao	Lectures	In-class exam on midterm exam date	yu.tsao@citi.sinica.edu.tw
4	<a href="#">2024/3/15@16:20</a> <a href="#">Webex Only</a>	Convolutional Neural Networks, Recurrent Neural Networks (optional: Graph Neural Networks)	Dr. Che Lin	Preview videos + online discussions	HW with a specified deadline: ▶ April 12th	che.lin@gmail.com
5	<a href="#">2024/3/22</a> <a href="#">Webex Only</a>	[DL in Life Science] GWAS and Variants	Dr. Tzu-Pin Lu	Preview videos + online discussions	HW with a specified deadline: ▶ April 5th	tplu@ntu.edu.tw
6	2024/3/29	Single cell RNA-seq	Dr. Yao-Ming Chang	Preview videos + in-class discussions	HW with a specified deadline: ▶ April 19th (was April 12th)	petitming@ibms.sinica.edu.tw
7	2024/4/5	National Holiday & Review Week (no class)	--	--	--	--
8	2024/4/12	Midterm Exam	--	--	--	--
9	2024/4/19	Network Analysis	Dr. Hsuan-Cheng Huang	Lectures	HW with a specified deadline: ▶ May 10th	hsuancheng@nycu.edu.tw
10	2024/4/26	[DL in Life Science] Graph Analysis [DL in Life Science] Drug Discovery	Dr. Yueh-Hua Tu	Preview videos + in-class discussions	HW with a specified deadline: ▶ April 26th	a504082002@gmail.com
11	2024/5/3	[DL in Life Science] Protein Structure Prediction	Dr. Chien-Yu Chen	Preview videos + in-class discussions	HW with a specified deadline	chienyuchen@ntu.edu.tw
12	<a href="#">2024/5/8 (Wed)</a> <a href="#">14:00-17:00</a>	Advanced Algorithms for Proteomics	Dr. Ching-Tai Chen	Preview videos + in-class discussions	HW with a specified deadline	ctchen@asia.edu.tw
13	<a href="#">2024/5/17</a> <a href="#">Webex Only</a>	Systems Biology and Biological Modeling of Gene Regulation	Dr. Yu-Chao Wang	Preview videos + online discussions	HW with a specified deadline: ▶ May 31st	yuchao@nycu.edu.tw
14	2024/5/24	Exploring modeling in enzyme kinetics and pharmacokinetics	Dr. An-Chi Wei	Preview videos + in-class discussions	HW with a specified deadline: ▶ June 7th	acwei86@ntu.edu.tw
15	2024/5/31	Review Week (no class)	--	--	--	--
16	2024/6/7	Final Exam	--	--	--	--