TIGP Bio 2021 Spring Syllabus
Advanced Algorithms (C2)

Place: Room 107, New Building of the Institute of Information Science, Academia Sinica.
Time: Friday 14:00-17:00
Chair: Dr. Chien-Yu Chen (chienyuchen@ntu.edu.tw)
Aim:
Outline: This course is basically about data mining, machine learning and statistical modeling from data, and some other algorithms and applications.
References: (reserved in the library of the Institute of Information Science)

1. Learning from Data- A Short Course (Abu-Mostafa, Magdon-Ismail, 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. Convex optimization (Boyd and Vandenberghe, 2004; book and lecture slides available at http://www.stanford.edu/~boyd/cvxbook/)

TA: Yueh-Hua Tu 杜岳華 **Email:** a504082002@gmail.com
Office hours: Friday 10:00 am-12:00 pm
Office location: Room 103, Old Building of the Institute of Information Science, Academia Sinica
Grades: Midterm exam 50%. Final exam 50%.

Note: For **Non-BP student** to register/sit-in any BP course, it is required to gain course chair's permission and follow the steps:
(1) Submit the hard copy or PDF file of the completed TIGP Bioinformatics Course Registration Consent Form to the TIGP BP office
(2) Provide the information via the google form at BP Class Enrollment Information.
The deadline for above requirement is the 4th week of each semester. Signature of corresponding BP Course Chair should be collected and 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.
※ For the most up-to-date syllabus, please visit https://tigpbp.iis.sinica.edu.tw/tigpbio/index.html

Week	Date	Topics/Brief Description Subtopics/Detail Descriptions/Examples	Lecturers
1	2021/02/26	Data Classification	Dr. Li Su
2	2021/03/05	Standard Optimization Algorithms Basic idea of optimization, Convex optimization, Lagrangial method for optimization method, and Gradient descent methods.	Dr. Wen-Liang Hwang
3	2021/03/12 @N106	Support Vector Machines and Large Margin and Kernel Methods Hard and soft support vector machines (SVM) and kernel methods. SVM is a convex optimization method. So, I can use the results of week 1 in week 2.	Dr. Wen-Liang Hwang
4	2021/03/19	Neural Networks and Deep Learning (I) The shallow neural network, and universality theorem	Dr. Wen-Liang Hwang
5	2021/03/26	Neural Networks and Deep Learning (II) Mathematical formulation for deep neural network, learning techniques, architecture, and implications.	Dr. Wen-Liang Hwang
6	2021/04/02	Review Week- Make-up holiday for Children's Day	---
7	2021/04/09	Hidden Markov Models	Dr. Yu Tsao

8	2021/04/16	Midterm Exam	---
9	2021/04/23 (Moved to 2021/04/26)	--	--
10	2021/04/26 (Mon.) @14:00-17:00 (Moved from 2021/04/23)	Graphical Models	Dr. Hsing-Kuo Pao
10	2021/04/30 @15:00-18:00	Conditional Random Fields	Dr. Richard Tzong-Han Tsai
11	2021/05/07	MapReduce in Cloud Computing	Dr. Yu-Jung Chang
12	2021/05/14	Advanced algorithms for NGS	Dr. Hsin-Nan Lin
13	2021/05/21 @Webex	Clustering for cancer subtyping	Dr. Ching-Tai Chen
14	2021/05/28 @Webex	Network Analysis	Dr. Hsuan-Cheng Huang
15	2021/06/04	Review Week	---
16	2021/06/11	Final Exam	