Syllabus

Ecology Masterclass@Taiwan (EMT2) 2022 (Spring)

Running course title: Marine Conservation Biology and Diversity: Ecology of the Northeast Coast of Taiwan

In the first lecture we will introduce the concept of this TIGP signature course to students and the three major subtopics of this year's course. The first is using population genomics to study the recovery of ecologically important flagship fishes after the implementation of protective regulations. The second is using cell biological techniques to study the early development of marine animals found in the tidepools. The third is to conduct simple surveys of marine life near Turtle island, including sampling of surface plankton through towing and sampling of organisms that settle onto settlement plates.

The next 3 lectures will be preparation including a combination of lectures, group discussions, and lab practicals. In March, we plan to spend 5 days at the ICOB Marine Research Station (MRS) in Yilan. Being based there allows us to easily access the local fish markets, marine tidepools, and Turtle Island for the main field aspects of the course. Additionally, we will conduct most of the developmental biology coursework at the MRS. Students will also learn how to use the cutting edge and portable Oxford Nanopore Technologies sequencing platform on site. The exact times may shift pending weather and the COVID situation.

The remaining part of the course will be based at the main campus of Academia Sinica. Students will receive lectures and practicals on NGS data handling, assembling mitogenome data and ddRADSeq analysis of the samples. Illumina sequencing will be done in collaboration with the BRCAS High Throughput Genomics Core. Lectures will also be given on manuscript writing. At the end, students will be divided into three groups to write up one or more short manuscripts.

Ecology Masterclass@Taiwan (EMT): Next-generation mentality and knowledge for conservation (Ecology and Conservation 2022 Spring)	
Organizers & Lecturers	Jen-Pan Huang (JPH), Jr-Kai Yu (JKY), Yung-Che Tseng (YCT), John Wang (JW), Jason Tsai (JT), Tzi-Yuan Wang (TYW), Benny Chan (BKKC)
Time	Fridays, 09:00-12:00
Place	•B204, 2F, Interdisciplinary Building, Academia Sinica (BRC Building) •Lab, Biodiversity Research Center •Marine Research Station, Yilan •Online if necessary due to COVID-19

Date/Class hour	Content	Lecturer	Venue
Class 1 2/25 (2hr)	Introduction Course approach, expectations, and weekly schedule Lecture on the basics and overview of ecological genomics and biodiversity studies: Questions asked, techniques used, modern approaches (case studies)	JPH, JKY, JW	B204, BRCAS
Class 2 3/4 (3hr)	Lecture and discussion: Chapters 6 and 9 of Molecular Population Genetics	JPH	BRCAS
Class 3 3/11 (3hr)	Basic concepts in molecular ecology. What is DNA, RNA, DNA sequencing, use of DNA sequencing in biodiversity/phylogeny. NGS sequencing and its applications, etc. Lab practical: DNA extraction for Sanger sequencing– practice for DNA extraction (and PCR)	JW TAs: research assistant (RA)	BRCAS (A304)
Class 4 3/18 (3hr)	Lecture: ddRADSeq theory and paper discussion Dry lab practical: RADSeq pipeline on mock data	JPH	BRCAS
Five consecutive days@ MRS Yilan Class 5-9 March 21-25			
Class 5 3/21	Lectures on Turtle Island preparations; Sampling at tidepool; Tidepool sample processing; Oxford Nanopore sequencing; Lectures (ONT sequencing and Evo-Devo)	**All day** JPH, JKY, YCT, TYW, BKKC, JW, +TAs	MRS
Class 6 3/22	Lecture and Lab: Evo-devo (cell and dev biol); embryology Sampling at fish market (afternoon); Fish sample processing;	**All day** JPH, JKY, YCT, TYW, BKKC, JW, +TAs	MRS

	Oxford Nanopore Lecture and analysis		
Class 7 3/23	Sampling around Turtle Island: sea water and plankton Turtle Island sample processing; Continue Fish Market sample processing; evo-devo; and ONT analysis	**All day;** JPH, JKY, YCT, TYW, BKKC, JW, +TAs	MRS
Class 8 3/24	Sampling at fish market; Sample processing; Developmental biology lab; Oxford Nanopore analysis	**All day;** JPH, JKY, YCT, TYW, JW, +TAs	MRS
Class 9 3/25	Oxford Nanopore analysis; Clean up	**All day;** JPH, JKY, YCT, TYW, JW, +TAs	MRS
Class 10 4/8 14:00-17:00 (3hr)	Lecture: Museum genomics; Teaching manuscript writing 1: Results and Methods	JW	B204, BRCAS
Class 11, 12 Bioinformatic analysis of NGS and Oxford Nanopore data			
Class 11 4/15 (3hr)	Genome annotation and analysis (from perspective of ecology evolution; mitogenomes). (Practical course)	Jason Tsai	B204, BRCAS
Class 12 4/22 (3hr)	Bioinformatic analysis of NGS (ddRADseq) and Oxford Nanopore data, part 1. Computer lab to learn basic command line interface. And then on mock data	JPH	B204, BRCAS
Class 13 4/29	Bioinformatic analysis of NGS (ddRADSeq) and Oxford Nanopore data, part 2.	JPH	B208 BRCAS

(3hr)			
Class 14 5/6 (3hr)	Teaching manuscript writing 2: Writing the introduction	JW	B208 BRCAS
Class 15 5/13 (3hr)	Teaching manuscript writing 3: Figures and tables; Discussion; the Submission process.	JW	B208 BRCAS
Class 16 5/20 (3hr)	Presentation & discussion 1 (Final exam)	JPH, JW, JKY	B208 BRCAS