COURSE CATALOG

2018-2019 Autumn Semester

International College of UCAS

Yanqihu Campus

Index

General Introduction

1. General Degree Requirements for Doctors

The requirement of UCAS for Doctor Degree is to get at least 8 credits before graduation. 4 credits should be from Professional Degree Courses. But students from institutes need to check out the requirements of your own institutes. Each institute has different requirement of credits. Please contact the Educational Administration of your own institutes first.

2. General Degree Requirements for Masters

The requirement of UCAS for Masters is to get at least 30 credits before graduation. At least 13 credits should be from Professional Degree Courses. Every master student needs to take at least 2 credits from optional courses.

3. General Degree Requirements for MD-PhD Students

The requirement of UCAS for MD-PhD students is to get at least 38 credits before graduation. 12 credits are from the Public Compulsory courses. At least 16 credits should be from Professional Degree Courses. Every student needs to take at least 2 credits from optional courses.

Types	Public compulsory courses	Optional courses	Professional degree courses	In total
Masters	**6 credits**	**≥2 credits**	**≥13 credits**	**≥30 credits**
PhD	**6 credits**	**None**	**≥4 credits**	**≥8 credits**
MD-PhD	**12 credits**	**≥2 credits**	**≥16 credits**	**≥38 credits**

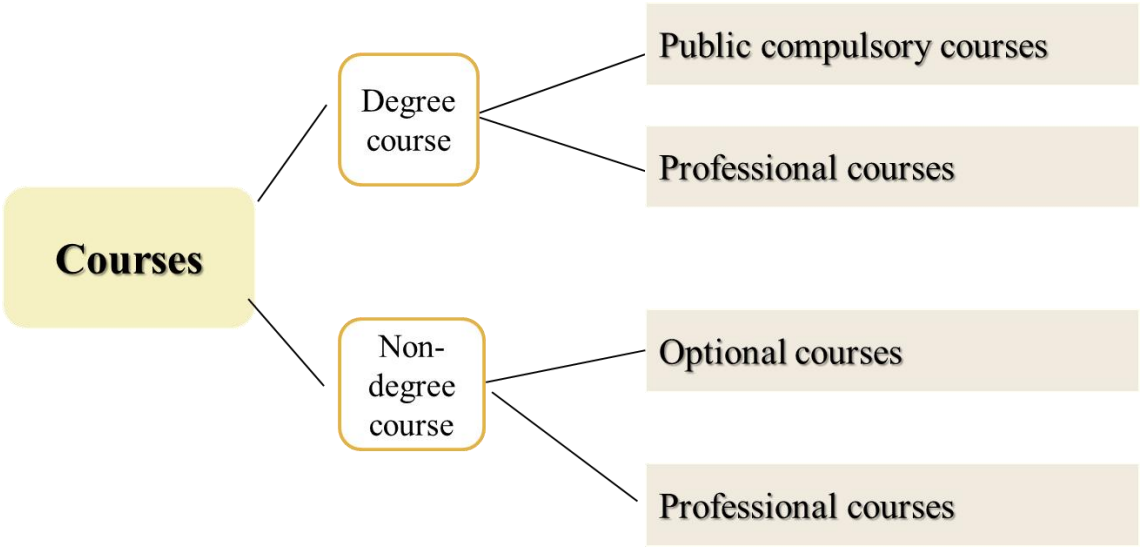
4. Other Requirements for CAS-TWAS fellowship students

1. You need to choose two professional courses and get marks from these courses. One professional course's marks will be calculated as 15% into the PHD Qualification Exam. Two professional courses' will be 30%.
2. These two professional courses can be Degree Courses or Non-Degree Courses, the decision of course classification is left to the supervisor. No matter Degree Course or Non-Degree Course, it will be the same percentage (15%) in the Qualification Exam.
3. Normally, the professional courses are also you Degree courses. Only when you

find the courses are useless for your research and you will be in the risk of failing it—getting less than 60 marks—the courses could be Non-Degree Courses.
4. If students do not get enough credits in International College, they need to take more courses when coming back institutes. But few institutes arrange English Professional Courses for international students.

5. Courses Type

Courses are classified as degree courses and non-degree courses.



5.1 Public compulsory courses (6 credits in total)—Degree Courses
(1) Elementary Chinese-Reading and Writing (2 credits);
(2) Elementary Chinese-Listening and Speaking (2 credits);
(3) China Panorama (2 credits).
These three Public compulsory courses are Degree Courses for all international students. However, we have a rule about **Course Waiver**. Students who can meet one of the conditions can apply for course waiver and will get 6 credits directly.
A. Providing a certificate of HSK Level 3;
B. Got a bachelor's degree or master's degree which are taught in Chinese.
Students who apply for the course waiver need to contact Ms. Season (**dingdanni@ucas.ac.cn)** before the end of September.

5.2 Professional courses—Degree Courses and Non-degree Courses
Professional courses this year in Yanqihu campus cover several academic areas. Most Professional courses are once a week and each time lasts 4 class hours. If one professional course has several parts, students who select this course need to complete all parts of this course, otherwise s/he may fail the course.

The professional courses can be classified as one of two types: Degree Courses and Non-degree Courses. This final decision of course classification for each student is left to the supervisor, as s/he is in the best position to assess the courses for the graduate programs. If students find the professional courses are totally not related to

his/her major and will not help the research for PhD, then these courses can be seen as Non-degree Courses (Optional Courses). If the professional courses will help the research for PhD, then they should be Degree Courses (Compulsory Courses). This classification of one course will be shown on the course selection form and the final score sheet. All the students have two weeks to attend the professional classes and choose them.

5.3 Optional courses—Non-degree Courses

This semester we have four optional courses, which should be Non-degree courses.

Application of MATLAB on Scientific Computing (2 credits);
Research Ethics (1 credit);
Scientific Writing (2 credits);
Travel Album China (2 credits).

6. Rules about courses results

Students should drop out of the university under one of the following circumstances:
1、Master candidates who fail two degree courses within one semester and still fail one after relearning the courses, or fail three degree courses during the school years.
2、PhD candidates who fail one degree course and still fail after relearning the course, or fail two courses during their school years.
The Language courses and China Panorama are all Degree courses.

7. Course Selection Process

Date	**Process**
Sep.10	Courses start.
Sep.10-Sep.21	Determine which professional courses you will take and select the professional courses in the Course Selection System.
Sep.25-Sep.28	Confirm signature in every professional courses.
Sep. 29-Oct. 7	National Day Vocation lasts 9 days.
Dec.31	Courses end.
Next Year	The transcripts will be sent to the institutes by UCAS.

Vocations: Mid-Autumn Festival lasts from Sep.22nd-Sep.24th; National Day lasts from Sep.29th-Oct.7th.

8. Course Selection System

This course selection system is for students registering professional courses online. Students will receive an email from the Course Selection System one week before courses start. Then students will have two weeks to choose the professional courses online and change the courses. Please use the Google Chrome or 360 browsers. Do not choose two courses schedule overlap. After courses starting two weeks, the system will be closed. Then everyone will receive the message for signing in the class to determine the professional courses.

Website: http://ic-course.ucas.ac.cn/
Username: Your email
Original password: 123456

The capacity of every course is limited and first come first select.

9. Transcript

In the middle of the semester every student will receive the "Evaluation" email from University's system automatically, but it is impossible for international students because it is all in Chinese. The result is you cannot check your marks from your system although they are there.

You can-

1. Wait for the transcript sent to institute in every Oct. or Nov.
2. Ask your institute's teacher check the results for you.
3. Before graduate everyone can apply a copy of transcript from your institute or the Academic Affair Office. (Not from IC-UCAS)

Academic Affair Office Working time

Campus	Time	具体地址 Address	Tel	Type
Yanqihu	Monday to Friday 13:30-16:00 p.m.	雁栖湖行政办公楼 217 房间 Office Building Room 217	69671069	Free
Zhongguancun	Fridays 8:30-11:00 a.m.\13:30-17:00	中关村校区教学楼东小楼 204 Teaching Building East Building Room 204	82640466	Free
Yuquan Road	Wednesdays 8:30-11:00 a.m.	玉泉路校区办公楼 137 房间 Office Building Room 137	88256199	Free
Yanqihu	Thursdays 13:30-16:00 p.m.	雁栖湖行政办公楼 217 房间 Office Building Room 217	69671069	Charged
Yuquan Road	Wednesdays 8:30-11:00 a.m.	玉泉路校区办公楼 137 房间 Office Building Room 137	88256199	Charged

Every recent graduate student can get one transcript free. More than one copies are charged.

10. Contact Information

Education Coordinator for Professional Courses:

- Phone: 010-82680563, Ms. Sophie
- E-mail: hutian@ucas.ac.cn

Education Coordinator for Language Courses:

- Phone: 010-82680986, Ms. Season
- E-mail: dingdanni@ucas.ac.cn

10. Professional Courses List

Code	Name	Hours/ Credits	Type	Professors		Time	Classroom	Capacity	Date
1707D1011H	Functional Nanostructures: Syntheses, Characterization and Device Application	60/4	Professional course	HE Jun	WEI Zhixiang	Wed.13:30-17:10	Teaching2-204	242	Sep.12-Dec.26,Day-off in Oct.3, 15times
1706D1016H	Overview of Recent Development of Physics	48/3	Professional course	ZHOU Yu feng et al.	SHI Xinghua	Thu.13:30-17:10	Teaching1-134	34	Sep.13-Dec.6,Day-off in Oct.4, 12times
1708D1017H	Fundamentals of Modern Astronomy	40/2.5	Professional course	GOU Lijun	WANG Lan	Tue.13:30-17:10	Teaching1-232	34	Sep.18-Nov.27,Day-off in Oct.2, 10times
1710D1018H	Data Mining	60/4	Professional course	LIU Ying		Mon.13:30-15:10 Wed.13:30-15:10	Teaching1-322	34	Sep.10-Dec.31,Day-off in Sep.24&Oct.1, 15times; Sep.12-Dec.26,Day-off in Oct.3, 15times
1707M1013H	Organometallic Chemistry-for masters	60/4	Professional course	SUN Wenhua		Mon.13:30-17:10	Teaching1-132	48	Sep.10-Dec.31,Day-off in Sep.24&Oct.1, 15times
1707D1012H	Organometallic Chemistry and Catalysis-for doctors	60/4	Professional course	SUN Wenhua		Tue.8:30-12:10	Teaching1-114	100	Sep.11-Dec.25,Day-off in Oct.2, 15times

1701D1002H	The Frontier of Genomics and Precision Medicine	60/4	Professional course	SUN Yingli et al.	Wed.13:30-17:10	Teaching1-123	48	Sep.12-Dec.19,Day-off in Oct.3, 14times
1701D1001H	Plant Molecular Biology and Genomics	60/4	Professional course	JING Haichun et.al.	Fri.13:30-17:10	Teaching2-227	216	Sep.14-Dec.28,Day-off in Oct.5, 15times
1701D1003H	Biophysics and Organelle Biology	40/2.5	Professional course	LIU Pingsheng	Wed.13:30-17:10	Teaching2-318	46	Sep.12-Nov.21,Day-off in Oct.3, 10times
1701D1004H	Fundamental Immunology	40/2.5	Professional course	FANG Min DUAN Xuefeng	Tue.8:30-12:10	Teaching1-115	100	Sep.11-Nov.20,Day-off in Oct.2, 10times
1701D1005H	Model Animals in Developmental Biology	60/4	Professional course	YUAN Li	Tue.13:30-17:10	Teaching2-418	48	Sep.11-Dec.25,Day-off in Oct.2, 15times
1701D1006H	Plant Physiology and Developmental Biology	60/4	Professional course	CHENG Youfa	Mon.13:30-17:10	Teaching1-313	48	Sep.10-Dec.31,Day-off in Sep.24&Oct.1, 15times
1714D1008H	Environmental and Natural Resource Economics	60/4	Professional course	DENG Xiangzheng	Tue.8:30-12:10	Teaching1-304	120	Sep.11-Dec.25,Day-off in Oct.2, 15times
1704D1007H	Overview of Climate Change Sciences	60/4	Professional course	KANG Shichang et al.	Mon.13:30-17:10	Teaching2-227	100	Sep.10-Dec.31,Day-off in Sep.24&Oct.1, 15times
1705D1009H	Earth System Science	60/4	Professional course	CHEN Fang JIA Gensuo	Mon.13:30-17:10	Teaching2-327	100	Sep.10-Dec.31,Day-off in Sep.24&Oct.1, 15times
1703D1010H	Introduction to Geodynamics	48/3	Professional course	WANG Shimin	Thu.13:30-17:10	Teaching2-418	58	Sep.13-Dec.6,Day-off in Oct.4, 12times

1712D1014H	Materials Production and Environmental Sciencesng	60/4	Professional course	DU Hao	Mon.13:30-17:10	Teaching2-427	100	Sep.10-Dec.31,Day-off in Sep.24&Oct.1, 15times
1713D1015H	Multi-Phase Chemical Reaction Engineering and Technology	48/3	Professional course	LIU Xiaoxing LU Bona	Fri.13:30-17:10	Teaching2-419	58	Sep.14-Dec.14,Day-off in Oct.5, 12times
1714D1038H	Environmental Chemistry and Advanced Diagnostic Technologies	60/4	Professional course	TIAN Zhenyu WENG Junjie	Tue.8:30-12:10	Teaching1-208	154	Sep.11-Dec.25,Day-off in Oct.2, 15times
1711D2039H	Mental Health Promotion-Perspectives from Chinese Cultural Tradition	60/4	Professional course	HAN Buxin et al.	Wed.13:30-17:10	Teaching1-219	35	Sep.12-Dec.26,Day-off in Oct.3, 15times
1705D1040H	Geographic Information Systems	48/3	Professional course	SONG Xianfeng et al.	Wed.13:30-17:10	Study Area3-244	75	Oct.10-Dec.26,Day-off in Oct.3,12times
17MGX041H	Application of MATLAB on Scientific Computing	40/2	Optional course	ZHANG Xiaoguang	Tue.8:30-12:10	Study Area3-244	75	Sep.11-Nov.20,Day-off in Oct.2,10times
17MGX002H-1	Research Ethics	21/1	Optional course	ZENG Changqing	Fri.19:00-21:40	Teaching2-125	100	Sep.14-Dec.28,Day-off in Oct.5,7times
17MGX002H-2	Research Ethics	21/1	Optional course	ZENG Changqing	Fri.13:30-16:20	Teaching2-104	242	Sep.14-Dec.28,Day-off in Oct.5,7times

17MGX001H-1	Scientific Writing	48/2	Optional course	YU Hua	Thu.13:30-17:10	Teaching2-318	58	Sep.13-Noc.29,Day-off in Oct.4,11times
17MGX001H-2	Scientific Writing	48/2	Optional course	YU Hua et al.	Wed.13:30-17:10	Teaching2-219	46	Sep.12-Nov.28,Day-off in Oct.3,11times
17MGX001H-3	Scientific Writing	48/2	Optional course	PENG Gong	Wed.13:30-17:10	Teaching2-436	46	Sep.12-Nov.28,Day-off in Oct.3,11times
17MGX001H-4	Scientific Writing	48/2	Optional course	LIU Yunlong	Thu.13:30-17:10	Teaching2-229	80	Sep.13-Noc.29,Day-off in Oct.4,11times
17MGX004H	Travel Album China	42/2	Optional course	CHU Guofei	Fri.13:30-16:20	Teaching2-213	300	Sep.14-Dec.21,Day-off in Oct.5,14times

11. Public Compulsory Courses List

Class No.	Code	Name	Hours/Credits	Time	Classroom	Teachers
Y-1	17DGB001H-1	Elementary Chinese-Reading and Writing	128/2.0	Mon.(8:30-10:10)	Teaching2-238	JIN Zhao
				Wed.(10:20-12:00)	Teaching2-238	
				Thur.(8:30-10:10)	Teaching2-238	
				Fri.(10:20-12:00)	Teaching2-238	
	17DGB002H-1	Elementary Chinese-Listening and Speaking	128/2.0	Mon.(10:20-12:00)	Teaching2-238	YANG Meng
				Wed.(8:30-10:10)	Teaching2-238	
				Thur.(10:20-12:00)	Teaching2-238	
				Fri.(8:30-10:10)	Teaching2-238	
	17DGB0	China Panorama	48/2.0	Fri.13:30-16:20	Teaching2-238	JIANG

	03H-1					Hong'en
Y-2	17DGB0 01H-2	Elementary Chinese-Reading and Writing	128/2.0	Mon.(10:20-12:00)	Teaching2-318	JIN Zhao
				Wed.(8:30-10:10)	Teaching2-318	
				Thur.(10:20-12:00)	Teaching2-323	
				Fri.(8:30-10:10)	Teaching2-318	
	17DGB0 02H-2	Elementary Chinese-Listening and Speaking	128/2.0	Mon.(8:30-10:10)	Teaching2-318	YANG Meng
				Wed.(10:20-12:00)	Teaching2-318	
				Thur.(8:30-10:10)	Teaching2-323	
				Fri.(10:20-12:00)	Teaching2-318	
	17DGB0 03H-2	China Panorama	48/2.0	Fri.19:00-21:40	Teaching2-238	JIANG Hong'en
Y-3	17DGB0 01H-3	Elementary Chinese-Reading and Writing	128/2.0	Mon.(8:30-10:10)	Teaching2-321	LI Duo
				Wed.(10:20-12:00)	Teaching2-321	
				Thur.(8:30-10:10)	Teaching2-419	
				Fri.(10:20-12:00)	Teaching2-321	
	17DGB0 02H-3	Elementary Chinese-Listening and Speaking	128/2.0	Mon.(10:20-12:00)	Teaching2-321	LIU Xiaomeng
				Wed.(8:30-10:10)	Teaching2-321	
				Thur.(10:20-12:00)	Teaching2-419	
				Fri.(8:30-10:10)	Teaching2-321	
	17DGB0 03H-3	China Panorama	48/2.0	Fri.13:30-16:20	Teaching2-334	LUO Wugan
Y-4	17DGB0 01H-4	Elementary Chinese-Reading and Writing	128/2.0	Mon.(10:20-12:00)	Teaching2-418	LI Duo
				Wed.(8:30-10:10)	Teaching2-418	
				Thur.(10:20-12:00)	Teaching2-418	

				Fri.(8:30-10:10)	Teaching2-418	
	17DGB0 02H-4	Elementary Chinese-Listening and Speaking	128/2.0	Mon.(8:30-10:10)	Teaching2-418	LIU Xiaomeng
				Wed.(10:20-12:00)	Teaching2-418	
				Thur.(8:30-10:10)	Teaching2-418	
				Fri.(10:20-12:00)	Teaching2-418	
	17DGB0 03H-4	China Panorama	48/2.0	Fri.19:00-21:40	Teaching2-334	LUO Wugan
Y-5	17DGB0 01H-5	Elementary Chinese-Reading and Writing	128/2.0	Mon.(8:30-10:10)	Teaching2-438	LI Ran
				Wed.(10:20-12:00)	Teaching2-438	
				Thur.(8:30-10:10)	Teaching2-438	
				Fri.(10:20-12:00)	Teaching2-438	
	17DGB0 02H-5	Elementary Chinese-Listening and Speaking	128/2.0	Mon.(10:20-12:00)	Teaching2-438	HE Fei
				Wed.(8:30-10:10)	Teaching2-438	
				Thur.(10:20-12:00)	Teaching2-438	
				Fri.(8:30-10:10)	Teaching2-438	
	17DGB0 03H-5	China Panorama	48/2.0	Fri.19:00-21:40	Teaching2-218	CAO Zhihong
Y-6	17DGB0 01H-6	Elementary Chinese-Reading and Writing	128/2.0	Mon.(10:20-12:00)	Teaching2-436	LI Ran
				Wed.(8:30-10:10)	Teaching2-436	
				Thur.(10:20-12:00)	Teaching2-436	
				Fri.(8:30-10:10)	Teaching2-436	
	17DGB0 02H-6	Elementary Chinese-Listening and Speaking	128/2.0	Mon.(8:30-10:10)	Teaching2-436	HE Fei
				Wed.(10:20-12:00)	Teaching2-436	
				Thur.(8:30-10:10)	Teaching2-436	
				Fri.(10:20-12:00)	Teaching2-436	

	17DGB0 03H-6	China Panorama	48/2.0	Tue.13:30-16:20	Teaching2-238	ZHU Jian
Y-7	17DGB0 01H-7	Elementary Chinese-Reading and Writing	128/2.0	Mon.(8:30-10:10)	Teaching2-414	HE Tao
				Wed.(10:20-12:00)	Teaching2-414	
				Thur.(8:30-10:10)	Teaching2-414	
				Fri.(10:20-12:00)	Teaching2-414	
	17DGB0 02H-7	Elementary Chinese-Listening and Speaking	128/2.0	Mon.(10:20-12:00)	Teaching2-414	LI Shuangshuang
				Wed.(8:30-10:10)	Teaching2-414	
				Thur.(10:20-12:00)	Teaching2-414	
				Fri.(8:30-10:10)	Teaching2-414	
	17DGB0 03H-7	China Panorama	48/2.0	Thu.19:00-21:40	Teaching2-219	ZHU Jian
Y-8	17DGB0 01H-8	Elementary Chinese-Reading and Writing	128/2.0	Mon.(10:20-12:00)	Teaching2-434	HE Tao
				Wed.(8:30-10:10)	Teaching2-334	
				Thur.(10:20-12:00)	Teaching2-434	
				Fri.(8:30-10:10)	Teaching2-434	
	17DGB0 02H-8	Elementary Chinese-Listening and Speaking	128/2.0	Mon.(8:30-10:10)	Teaching2-434	LI Shuangshuang
				Wed.(10:20-12:00)	Teaching2-334	
				Thur.(8:30-10:10)	Teaching2-434	
				Fri.(10:20-12:00)	Teaching2-434	
	17DGB0 03H-8	China Panorama	48/2.0	Mon.19:00-21:40	Teaching2-118	YE Qing
Y-9	17DGB0 01H-9	Elementary Chinese-Reading and Writing	128/2.0	Mon.(8:30-10:10)	Teaching2-313	WANG Lei
				Wed.(10:20-12:00)	Teaching2-313	
				Thur.(8:30-10:10)	Teaching2-313	

				Fri.(10:20-12:00)	Teaching2-314	
	17DGB0 02H-9	Elementary Chinese-Listening and Speaking	128/2.0	Mon.(10:20-12:00)	Teaching2-313	AN Wai'er
				Wed.(8:30-10:10)	Teaching2-313	
				Thur.(10:20-12:00)	Teaching2-313	
				Fri.(8:30-10:10)	Teaching2-314	
	17DGB0 03H-9	China Panorama	48/2.0	Mon.19:00-21:40	Teaching2-121	CHEN Tianjia
Y-10	17DGB0 01H-10	Elementary Chinese-Reading and Writing	128/2.0	Mon.(10:20-12:00)	Teaching2-413	WANG Lei
				Wed.(8:30-10:10)	Teaching2-413	
				Thur.(10:20-12:00)	Teaching2-214	
				Fri.(8:30-10:10)	Teaching2-413	
	17DGB0 02H-10	Elementary Chinese-Listening and Speaking	128/2.0	Mon.(8:30-10:10)	Teaching2-413	AN Wai'er
				Wed.(10:20-12:00)	Teaching2-413	
				Thur.(8:30-10:10)	Teaching2-213	
				Fri.(10:20-12:00)	Teaching2-413	
	17DGB0 03H-10	China Panorama	48/2.0	Thu.13:30-16:20	Teaching2-414	YANG Yimin
Y-11	17DGB0 01H-11	Elementary Chinese-Reading and Writing	128/2.0	Mon.(8:30-10:10)	Teaching2-423	ZHU Zhengkang
				Wed.(10:20-12:00)	Teaching2-423	
				Thur.(8:30-10:10)	Teaching2-314	
				Fri.(10:20-12:00)	Teaching2-423	
	17DGB0 02H-11	Elementary Chinese-Listening and Speaking	128/2.0	Mon.(10:20-12:00)	Teaching2-423	LI Sheng'nan
				Wed.(8:30-10:10)	Teaching2-423	
				Thur.(10:20-12:00)	Teaching2-314	
				Fri.(8:30-10:10)	Teaching2-423	

	17DGB0 03H-11	China Panorama	48/2.0	Thu.19:00-21:40	Teaching2-121	YANG Yimin
Y-12	17DGB0 01H-12	Elementary Chinese-Reading and Writing	128/2.0	Mon.(10:20-12:00)	Teaching2-419	ZHU Zhengkang
				Wed.(8:30-10:10)	Teaching2-419	
				Thur.(10:20-12:00)	Teaching2-336	
				Fri.(8:30-10:10)	Teaching2-419	
	17DGB0 02H-12	Elementary Chinese-Listening and Speaking	128/2.0	Mon.(8:30-10:10)	Teaching2-419	LI Sheng'nan
				Wed.(10:20-12:00)	Teaching2-419	
				Thur.(8:30-10:10)	Teaching2-336	
				Fri.(10:20-12:00)	Teaching2-419	
	17DGB0 03H-12	China Panorama	48/2.0	Fri.19:00-21:40	Teaching2-219	CHU Guofei
Y-13	17DGB0 01H-13	Elementary Chinese-Reading and Writing	128/2.0	Mon.(8:30-10:10)	Teaching2-338	ZHANG Jiehua
				Wed.(10:20-12:00)	Teaching2-338	
				Thur.(8:30-10:10)	Teaching2-338	
				Fri.(10:20-12:00)	Teaching2-338	
	17DGB0 02H-13	Elementary Chinese-Listening and Speaking	128/2.0	Mon.(10:20-12:00)	Teaching2-338	QI Bo'peng
				Wed.(8:30-10:10)	Teaching2-323	
				Thur.(10:20-12:00)	Teaching2-338	
				Fri.(8:30-10:10)	Teaching2-338	
	17DGB0 03H-13	China Panorama	48/2.0	Tue.09:20-12:10	Teaching2-225	LAN Li
Y-14	17DGB0 01H-14	Elementary Chinese-Reading and Writing	128/2.0	Mon.(10:20-12:00)	Teaching2-214	ZHANG Jiehua
				Wed.(8:30-10:10)	Teaching2-434	
				Thur.(10:20-12:00)	Teaching2-423	

				Fri.(8:30-10:10)	Teaching2-214	
	17DGB0 02H-14	Elementary Chinese-Listening and Speaking	128/2.0	Mon.(8:30-10:10)	Teaching2-214	QI Bo'peng
				Wed.(10:20-12:00)	Teaching2-421	
				Thur.(8:30-10:10)	Teaching2-425	
				Fri.(10:20-12:00)	Teaching2-214	
	17DGB0 03H-14	China Panorama	48/2.0	Tue.13:30-16:20	Teaching2-314	LAN Li

2018－2019 学年秋季学期(Autumn Semester)校历

年度 year	2018																	2019		
月份 month	九月(Sep)				十月(Oct)				十一月(Nov)					十二月(Dec)				一月(Jan)		
周次 week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
星期一（Mon）	3	10	17	24 中秋节	1 国庆节	8	15	22	29	5	12	19	26	3	10	17	24	31	7	14
星期二（Tue）	4	11	18	25	2	9	16	23	30	6	13	20	27	4	11	18	25	1 元旦	8	15
星期三（Wed）	5	12	19	26	3	10	17	24	31	7	14	21	28	5	12	19	26	2	9	16
星期四（Thu）	6	13	20	27	4	11	18	25	1	8	15	22	29	6	13	20	27	3	10	17
星期五（Fri）	7	14	21	28	5	12	19	26	2	9	16	23	30	7	14	21	28	4	11	18
星期六（Sat）	8	15	22	29	6	13	20	27	3	10	17	24	1	8	15	22	29	5	12	19
星期日（Sun）	9	16	23	30	7	14	21	28	4	11	18	25	2	9	16	23	30	6	13	20
说 明	1、Courses start from Sep. 10th. Courses end to Dec.31st. Vocations: Mid-Autumn Festival lasts from Sep.22nd-Sep.24th; National Day lasts from Sep.29th-Oct.7th																			

Course Syllabus

Course title

Functional Nanostructure: Synthesis, Characterizations and Device Applications

Instructor(s)-in-charge:

Prof. HE Jun &Prof. WEI Zhixiang

Course type:

Lecture

Course Schedule:

4hrs/week by instructor. 1 hr/week by teaching assistant.

Course Assessment:

Homework: 12 assignments

Grading Policy:

Typically 40% homework, 40% each midterm, 20% final.

Course Prerequisites:

Solid state physics, semiconductor physics, general chemistry，physical chemistry

Catalog Description:

This course includes three sections: inorganic semiconductor nanostructures, organics functional nanostructure and characterization of nanomaterials. The first section provides atoms-to-device introduction to the latest semiconductor quantum heterostructures. It covers nanostructures growth, their electronic, optical, and transport properties, their role in exploring new physical phenomena, and their utilization in devices. For the second part, by studying of this section, student should know the history and principles of organic electronics, understand how to use various strategies to produce organic functional nanomaterials, get the ideas how to construct organic electronic and optoelectronic devices, including filed effect transistors, light emitting diodes, and photovoltaics. The third provides Electron microscopic characterization of nanomaterials, Spectroscopic characterization of nanomaterials and some latest applications of nanomaterials.

Schedule of the course

section	content	hours	Date
1	Basic of Low dimensional-semiconductors	8	September 12 September 19
2	Low dimensional semiconductors growth	8	September 26 October 10
3	Low dimensional semiconductor: device applications	8	October 17 October 24
4	Student presentation	4	October 31
5	Histories and principles of organic electronics	4	November 7
6	Preparation of organic electronic nanomaterials	4	November 14
7	Properties and applications of organic	4	November 21

	functional materials		
8	Electron microscopic characterization of nanomaterials	4	November 28
9	Spectroscopic characterization of nanomaterials	4	December 5
10	Applications of nanomaterials in nanomedicine	4	December 12
11	Student presentation	4	December 19
12	Exam	4	December 26
total		60	

Contents of the course

Section 1: Low dimensional semiconductors

1. History and principles organic electronics
   (1) History of modern physics
   (2) The origin of conducting and semiconductingproperties of low dimensional semiconductor
2. Growth technique of Low dimensional semiconductors
   (1) Molecul;ar beam epitaxy
   (2) Metal-organicChemicalVaporDeposition
   (3) ChemicalVaporDeposition
3. Properties and application of Low dimensional semiconductors
   (1) Opto-electronic devices
   (2) Solar and Environmental applications
   (3) Nanogenerator and others

Section 2: Organic functional materials

4. History and principles organic electronics
5. History of organic electronics
6. The origin of conducting and semiconductingproperties of organic functional materials
7. Preparation of organic functional nanomaterials
8. Self-assembly of organic functional nanomaterials
9. Fabrication method of organic electronic devices
10. Properties and application
11. organic filed effect transistors
12. organic light emitting diodes
13. organic photovoltaics

Section 3: Characterization of nanomaterials

14. Electron microscopic (EM) characterization of nanomaterials
15. Introduction to transmission electron microscopy (TEM), scanning electron microscopy (SEM), electron diffraction and related techniques
16. Examples using electron microscopy to characterize nanomaterials (such as nanowires, quantum dots, graphene, carbon nanotubes)
17. By studying of this section, student will know the principle of EM and its

applications in nanomaterial characterization.

18. Spectroscopic characterization of nanomaterials
19. Introduction to FL, Raman and IR
20. Examples using FL, Raman and IR to characterize nanomaterials (such as nanowires, quantum dots, graphene, carbon nanotubes)
21. By studying of this section, student will know the principle of FL, Raman and IR and their application in nanomaterial characterization.
22. Applications of nanomaterials in biomedicine
23. Nanomaterials as imaging probes
24. Nanomaterials as drug carriers
25. By studying of this section, student will get a brief idea about broad applications of nanomaterials in nanomedicine.

Textbook and any related course material:

Low dimensional semiconductor structures: fundamental and device applications
Edited by Keith Barnham and Dimitri Vvedensky
Organic Electronics, Materials, Processing, Electronics, and Apllications
Edited by Franky So
Characterization of Materials, edited by Elton N. Kaufmann (editor-in-chief), Wiley-Interscience.
Transmission Electron Microscopy, edited by David B. Williams and C. Barry Carter, Springer.
Principles of Fluorescence Spectroscopy, third edition, edited by Joseph R. Lakowicz, Springer.
Introductory Raman Spectroscopy, second edition, edited by John R. Ferraro, Kazuo Nakamoto and Chris W. Brown, Elsevier.

Expected level of proficiency from students entering the course:

Mathematics: strong
Physics: strong
Chemistry: strong

Course title

Overview of Recent Development of Physics Part I

Instructor(s)-in-charge:

Prof. ZHOU Yufeng et al.

Course type:

Lecture

Catalog Description:

This course will introduce some basic concepts and frontiers of some theoretical physics directions, pay particular attention to general relativity, black hole physics, dark energy, dark matter and standard cosmological model, standard model of particle physics and beyond, Bose-Einstein condensation, phases and superconductivity in condensed matter, and so on.

Schedule of the course:

section	content	Professor	hours	Date
1	Origin of matter antimatter asymmetry	YU Jianghao	4	Sep. 13
2	Modern Cosmology	HUANG Qingguo	4	Sep. 20
3	Condensed Matter Physics	QIN Shaojing	4	Sep. 27
4	New physics beyond the Standard Model	YANG Jinmin	4	Oct. 11
5	Dark Matter	ZHOU Yufeng	4	Oct. 18
total			20	

Course title

Overview of Recent Development of Physics Part II-Overview of Modern Mechanics

Instructor(s)-in-charge:

Prof. SHI Xinghua

Course type:

Lecture

Office: R209@South Building, National Center for Nanoscience and Technology, CAS

Email: shixh@nanoctr.cn

Textbook: F. Bower, Applied Mechanics of Solids, CRC Press, 2009 (http://solidmechanics.org); Ya-Pu Zhao (赵亚溥), Lecture on Mechanics (力学讲义), 科学出版社, 2018

Pre-requisites and Co-requisites: None

Exam: Attendance 30%, Performance 20%, Homework 30%, Final project 20%

Course Content:

This course is designed primarily for the non-mechanics students who are interested in the mechanics-related problems in their future research work. This course is an introduction to the modern mechanics among which we would discuss the basic concepts and theories of deform and motion of an object, as well as the analytical methods. In the process, we will show how these concepts, theories and analytical methods work in the structural design, material selection and safety assessment in mechanical engineering, aerospace engineering, civil engineering, and other related fields like biology.

The topics we will cover include:

- Basic concepts of mechanics, such as displacement, strain, stress, constitutive relation, material strength, fracture, fatigue, etc
- Classical mechanics, Newtonian mechanics, Lagrangian mechanics
- Elastic mechanics, plastic mechanics, entropic elasticity, soil mechanics, biomechanics, etc
- Basic concepts of contact mechanics, fracture mechanics
- Basic concepts of finite element method (FEM)
- Basic concepts of fluid mechanics
- Some implications of mechanics you will find in life and research, like AFM, flexible electronics, gecko, cell, high speed train, etc

Schedule of the course:

section	content	hours	Date
1	Introduction of the basic concepts of mechanics, the implications, Classical mechanics, Newtonian Mechanics	4	25-Oct
2	Lagrangian mechanics, elastic mechanics, entropic elasticity	4	1-Nov
3	Strength of materials, plastic mechanics, soil mechanics	4	8-Nov

4	Contact mechanics, fracture mechanics	4	15-Nov
5	Finite element method	4	22-Nov
6	Basic concepts of fluid mechanics, microfludics	4	29-Nov
7	Presentation, Lab tour	4	6-Dec
total		28	

Course title

Fundamentals of Modern Astronomy

Instructor(s)-in-charge:

Dr. Lijun Gou, Dr. Lan Wang

Teaching assistant:

Dr. Zhixia Shen (zshen@nao.cas.cn)

Course type:

Lecture

Course Schedule:

4hrs/week by instructors

Pre-requisites and Co-requisites:

None

Credits:

2.5

Course Content:

This course is designed primarily for the non-astronomy student who wishes to explore in depth a single topic in astronomy without becoming involved in detailed mathematical developments. In the process, we will see how scientific ideas develop and how scientists think about or approach problems.

This course is an introduction to our modern view of the universe, its contents, and how they got to be the way they are. Among the topics we will discuss are galaxies, quasars, stars, and black holes as well as the modern cosmology. For each of these objects, we will talk about what they are, how they are observed, how they form, and how they fit into the overall scheme of things in the universe. Due to the constraints of time, there are a number of topics, which we will not be able to discuss in detail. These omissions are made not because the subjects are of no interest to astronomers, but rather because we will not have time to discuss all of the interesting and important topics in astronomy.

Classical topics in astronomy, such as constellations and the appearance of the night sky, will not be covered in this course.

The topics we will cover include:

• The nature and lives of stars
• The stellar remnants (neutron stars and black holes, etc)
• The nature of our Milky Way Galaxy
• Properties of other galaxies and the foundation of modern cosmology
• Dark Energy, and the fate of the Universe

Course Objectives:

By the conclusion of this course, students should be able to:
•Explain the scientific process and how scientific theories are developed and tested.

•Recall basic physical concepts such as gravitational and conservation laws, and how light and matter interact.
•Describe the general characteristics of the universe.
•Apply scientific thinking to the natural world to understand, e.g. what powers the sun, why galaxies differ, and how the universe began.
•Formulate a scientific hypothesis, identify a testable prediction, verify by carrying out an experiment, and assess the results.

Textbook:
The Essential Cosmic Perspective, 7 th(or 6 th) Edition by Bennett, Donahue, Schneider, & Voit; Pearson Press.

Course title

Data Mining

Instructor(s)-in-charge:

Prof. LIU Ying

Course type:

Lecture

Course Schedule:

Mondays 13:30-15:10 pm & Wednesdays 13:30-15:10 pm

Course Assessment:

Homework: 2 assignments, 1 project

Grading Policy:

Typically 30% homework, 30% project, 40% final.

Course Prerequisites:

data structure, computer algorithms, programming, database

Catalog Description:

The goal of the course is to provide the students with knowledge and hands-on experience in developing data mining algorithms and applications. Firstly, the course will introduce the motivation of data mining techniques. Then, present the principles and major classic algorithms in data mining. Next, the course will introduce some successful applications to the students. Finally, big data and the most recent techniques will be introduced as well.

Schedule of the course

section	content	hours
1	Introduction	4
2	Data Warehouse	4
3	Data Preprocessing	4
4	Association Rules Mining	6
5	Classification	6
6	Clustering	6
7	Sequence Mining	2
8	Applications	6
9	Big Data Mining	12
10	Project Discussion & Demo	8
11	Review	2
total		60

Contents of the course:

Section 1: Introduction

Motivation, major issues, major applications, characteristics

Section 2: Data warehouse

Model, architecture, operations

Section 3: Data pre-processing

Data cleaning, data transformation, data reduction

Section4: Association rules

Apriori, FP-Growth, Partition, DIC, DHP, multi-level association rules, quantitative association rules, major applications

Section 5: Classification

Decision tree, Bayesian Classifier, Classification by backpropagation, KNN classifier, statistical prediction models, major applications

Section 6: Clustering

Partitioning methods, hierarchical methods, density-based methods, grid-based methods, major applications

Section 7. Sequence mining

GSP, SPADE

Section 8: Applications

Credit scoring, oil exploration, customer relationship management, cosmological simulation

Section 9:Big data mining

Big data, big data characteristics, big data mining techniques including high performance mining, Web mining, stream mining, graph mining, text mining, cloud mining, etc.

Section 10: Project Discussion & Demo

Students and the instructor discuss the course projects in class, and students present their work and make demonstrations.

Textbook and any related course material:

Data Mining, Concepts and Techniques. Jiawei Han and MichelineKamber, Morgan Kaufmann, 2006.

Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Addison-Wesley, 2006.

Research papers: to be announced in class

Course title

Organometallic Chemistry-for Masters

Instructor(s)-in-charge:

Prof. SUN Wenhua & Associate Prof. MA Yanping

Course type:

Lecture

Course Schedule:

4hrs/week by instructor. 1 hr/week by teaching assistant.

Course Assessment:

Homework: 14 assignments

Grading Policy:

Typically 40% homework, 10% evaluation，30% for assessment (2 times, 15% each), 20% final. 5% plus to student presentation

Course Prerequisites:

General chemistry

Catalog Description:

Chemistry is the center of sciences, and organometallic chemistry is the useful tool for chemists to understand how organic molecules or groups interact with compounds of the inorganic elements. On the base of Organometallic Chemistry, the industries of chemical, petrochemical, pharmacy and organic materials have been continuously developing. With regard to Periodic Table of Elements, main group elements consisting of the s and p blocks and the transition elements of the d and f blocks would be discussed, respectively. Those organometallic compounds have been useful building blocks for nanoparticles and assembling materials. Importantly, organometallic compounds have been stoichiometric reagents and (pre)catalysts in tremendously industrial processes. In addition, organometallic compounds are also considerable for molecule biology. Therefore organometallic chemistry is a Capital Stone for scientists in chemistry, material science and nano-science.

Schedule of the course

section	content	hours	Date
1	Organometallic Chemistry: Definition & Scope Periodic Table of Elements *Evaluation regarding student background*	4	Sep. 10
2	Various ligands and their electrons contributions	4	Sep. 17
3	Alkali Metal Organometallics Alkaline Earth Metal Organometallics	4	Oct. 8
4	Zinc, Cadmium, and Mercury organometallics Stoichiometric reactions *Tutorial assessment*	4	Oct. 15
5	Synthetic methodology oriented	4	Oct. 22

	organometallic chemistry: A Practice		
6	Organometallics of the Boron Group Organometallics of the Carbon group	4	Oct. 29
7	Transition metal Organometallics: Common types of organometallic complexes; 16/18 ev; ligand types and behaviors and oxidation states	4	Nov. 5
8	Metal Carbonyl Complexes: Definition and types; from mononuclear to nanoparticles Industrial hydroformylation	4	Nov. 12
9	Organometallic compounds ligated by alkenes, dienes, and alkynes Student presentations (Topic discussions)	4	Nov. 19
10	Metallocene and Arene complexes	4	Nov. 26
11	Sigma Complexes *Tutorial assessment*	4	Dec. 3
12	Organometallic application: C-C and C-N cross couplings	4	Dec. 10
13	Industrial processes: ethylene oligomerization and olefin polymerization	4	Dec. 17
14	Student presentations (interpretation conceptual novelty to literature) Q and A sessions	4	Dec. 24
15	**Open note test (notebook and files within personal computer allowed, but not any text books)**	2	Dec. 31
	Official hour every week by Prof. SUN Wenhua and Prof. MA Yanping, if necessary		
total		60	

Textbook and any related course material:

Organometallics and Catalysis: An Introduction Edited by Manfred Bochmann. Oxford University Press 2015.

THE ORGANO METALLIC CHEMISTRY OF THE TRANSITION METALS Sixth Edition, Edited by Robert H. Crabtree. John Wiley & Sons, Inc 2014.

Course title

Organometallic Chemistry and Catalysis-for Doctors

Instructor(s)-in-charge:

Prof. SUN Wenhua & Associate Prof. MA Yanping

Course type:

Lecture

Course Schedule:

4hrs/week by instructor. 1 hr/week by teaching assistant.

Course Assessment:

Homework: 14 assignments

Grading Policy:

Typically 40% homework, 10% evaluation，30% for assessment (2 times, 15% each), 20% final. 5% plus to student presentation

Course Prerequisites:

General chemistry

Catalog Description:

Chemistry is the center of sciences, and organometallic chemistry is the useful tool for chemists to understand how organic molecules or groups interact with compounds of the inorganic elements. On the base of Organometallic Chemistry, the industries of chemical, petrochemical, pharmacy and organic materials have been continuously developing. A catalyst increases the rate of a reaction without being consumed and without changing the thermodynamics of the reaction, providing bases for modern chemical industries. With regard to Periodic Table of Elements, main group elements consisting of the s and p blocks and the transition elements of the d and f blocks would be discussed, respectively. Those organometallic compounds have been useful building blocks for nanoparticles and assembling materials. Importantly, organometallic compounds have been stoichiometric reagents and (pre)catalysts in tremendously industrial processes. Therefore organometallic chemistry and catalysis are the Capital Stone for scientists in chemistry, material science and industry.

Schedule of the course

section	content	hours	Date
1	Organometallic Chemistry: Definition & Scope Introduction to Catalysis *Evaluation regarding student background*	4	Sep. 11
2	Periodic Table of Elements Various ligands and their electrons contributions	4	Sep. 18
3	Alkali Metal Organometallics Alkaline Earth Metal Organometallics	4	Sep. 25
4	Zinc, Cadmium, and Mercury organometallics Stoichiometric reactions	4	Oct. 9

	Tutorial assessment		
5	Synthetic methodology oriented organometallic chemistry: A Practice	4	Oct. 16
6	Organometallics of the Boron Group Organometallics of the Carbon group	4	Oct. 23
7	Transition metal Organometallics: Common types of organometallic complexes; 16/18 ev; ligand types and behaviors and oxidation states	4	Oct. 30
8	Metal Carbonyl Complexes: Definition and types; from mononuclear to nanoparticles Industrial hydroformylation	4	Nov. 6
9	Organometallic compounds ligated by alkenes, dienes, and alkynes Student presentations (Topic discussions)	4	Nov. 13
10	Metallocene and Arene complexes	4	Nov. 20
11	Sigma Complexes Hydrogenation *Tutorial assessment*	4	Nov. 27
12	Organometallic application: C-C and C-N cross couplings and new progresses	4	Dec. 4
13	Industrial processes: ethylene oligomerization and olefin polymerization	4	Dec. 11
14	Student presentations (interpretation conceptual novelty) Q and A sessions	4	Dec. 18
15	**Open note test (notebook and books along with personal computer allowed, but no discussion)**	4	Dec. 25
	Official hour every week by Prof. SUN Wenhua and Prof. MA Yanping, if necessary		
total		60	

Textbook and any related course material:

Organometallics and Catalysis: An Introduction Edited by Manfred Bochmann. Oxford University Press 2015.

THE ORGANO METALLIC CHEMISTRY OF THE TRANSITION METALS Sixth Edition, Edited by Robert H. Crabtree. John Wiley & Sons, Inc 2014.

Course title

The Frontier of Genomics and Precision Medicine

Instructor(s)-in-charge:

Prof. Yingli Sun (Beijing Institute of Genomics, Chinese Academy of Sciences)
Prof. Zhihua Zhang (Beijing Institute of Genomics, Chinese Academy of Sciences)
Prof. Cheng Li (Peking University, School of Life Sciences)
Prof. Lei Shi (Tianjin Medical University)

Course type:

Lecture

Course Schedule:

4hrs/week by instructor. 1 hr/week by teaching assistant.

Course Assessment:

Homework: 2 assignments

Grading Policy:

Attendance: 10% , Homework: 30% , Final examination: 60%

Course Prerequisites:

Molecular biology, Statistics, Computer programming

Catalog Description:

Epigenetics and chromatin structures, DNA replication and DNA damage, and response and repair of DNA damage in chromatin environment. The first section provides an introduction to the concept of "epigenetics" and the structures of chromatins. It covers chromatin remodeling and the modifications of DNA and histones, and their roles in chromatin structure maintenance and chromatin based signal transduction. For the second part, by studying of this section, student should know the principles of DNA replication and cellular checkpoint, understand how cells sense and repair damaged DNA. The third provides current understanding of how chromatin modifications or higher structures contribute to DNA damage response (DDR) in chromatin context, and in this section we will also discuss how DDR defects will contribute to cancer development.

Contemporary life sciences and medicine are moving towards the era of large data as represented by high-throughput sequencing. How to model, analyze and interpret genomic data will determine whether we can quickly and accurately discover new biological phenomena and rules, and provide accurate medical care for patients. This course will introduce common data types in genomics, such as DNA-seq, RNA-seq, and statistical analysis and graphing methods commonly used in data analysis, including exploratory data analysis, linear regression, data dimension reduction and clustering. The course will discuss genomics literature and data, and use the R language programming environment for data analysis and graphing exercises.

Schedule of the course

section	content	hours	Date
1	Introduction to Molecular Biology and Genomics	4	September 12

2	DNA and DNA Replication	4	September 19
3	RNA,Transcription and RNA Processing	4	September 26
4	Protein and genetic codon	4	October 10
5	Regulation of gene expression	4	October 17
6	Research progress on Genomics	4	October 24
7	Introduction to R language and graphics	4	October31
8	Linear regression and applications to genomics data	4	November 07
9	Transcription regulatory factor binding sites and human disease	4	November 14
10	Noncoding RNA and Human Disease	4	November 21
11	3D genomics and human disease	4	November 28
12	Introduction to Gene Regulatory Network	4	December 05
13	Epigenetics and chromatin structures	4	December 12
14	DNA damage and DNA replication	4	December 19
15	Response and repair of DNA damage in chromatin environment	4	December 26
total		60	

Contents of the course

Section 1: Introduction to Molecular Biology and Genomics

Section 2: DNA and DNA Replication

1. Content and Structure of chromosome
2. Basic element and structure of DNA
3. DNA replication

Section 3: RNA,Transcription and RNA Processing

1. Transfer of Genetic Information: The Central Dogma
2. The Process of Gene Expression
3. Transcription in Prokaryotes
4. Transcription and RNA Processing in Eukaryotes
5. Interrupted Genes in Eukaryotes: Exons and Introns
6. Removal of Intron Sequences by RNA Splicing

Section 4: Translation and Genetic Code

1. Elements and process in Translation
2. Structure and function of protein
3. About Genetic code

Section 5: Regulation of gene expression

1. Gene expression refers to the process of gene transcription and Translation
2. Gene expression with temporal specificity and spatial specificity
3. Gene expression and regulation have a big difference between each other

4. Regulation of gene expression is necessary for the organism growth and development

Section 6: Research progress on Genomics

5. Genome Project
6. Single Cell Sequence
7. Epigenetics Research Progress
8. The Cancer Genome Atlas
9. Gene Detection with Genomic Technology

Section 7: Introduction to R language and graphics

1. Introduction to genomics data
2. Introduction to R language
3. Demo of R language
4. R syntax
5. R flow control
6. Use R to make graphs
7. Efficient programming in R

Section 8: Linear regression and applications to genomics data

1. Correlation and association
2. Continuous vs. discrete variables
3. Simple linear regression
4. Multiple linear regression
5. Selection of variables and model validation
6. Application examples to genomics data
7. Use linear regression in R

Section 9: Transcription regulatory factor binding sites and human disease

1. Basic principle of transcription;
2. Identification of transcription regulatory factor binding sites
3. Transcription regulatory factor binding sites and human disease
4. Promoter and enhancer identification methods

Section 10: Noncoding RNA and Human Disease

1. DNA methylation, histone Modification and Gene expression Regulation
2. Basic experimental techniques for Noncoding RNA
3. Noncoding RNA and Human Disease
4. Basic experimental techniques for 3D Genome

Section11: 3D genomics and human disease

1. Methods for recognition of Compartment A/B and TAD
2. Reconstruction of the 3D genomic structure
3. Chromatin loop identification methods based on multi-omics approach
4. 3D genomics and human disease

Section 12: Introduction to Gene Regulatory Network

1. Introduction to Gene Regulatory Network
2. Basic Concepts of population Genetics I
3. Basic Concepts of population Genetics II.
4. Application of population Genetics in Precision Medicine

Section 13: Epigenetics and chromatin structures

1. History and principles epigenetics
2. Chromatin structures
   (1) From histone to chromatin
   (2) Chromatin remodeling
   (3) Modifications of DNA and histones
   (4) Chromatin structure maintenance and chromatin based signal transduction

Section 14: DNA damage and DNA replication

1. The principles of DNA replication
   (1) DNA replication, replication fork stalling and collapse
   (2) Cell cycle and checkpoint
2. DNA damage response (DDR)
   (1) Different types of DNA damage
   (2) Damage sensing and signal transduction
   (3) Repair pathways

Section 15: Response and repair of DNA damage in chromatin environment

1. Chromatin remodeling and DDR
2. Histone modifications and DDR
3. Chromatin relaxation and compaction on DDR
4. How DDR defects will contribute to cancer development

Textbook and any related course material:

1. *《An Introduction to Statistical Learning with Applications in R》*
Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani, Springer
Free PDF version: http://www-bcf.usc.edu/~gareth/ISL/
NOTE: This book is only suggestive, not imperative.
2. *《Epigenetics》*, Cold Spring Harbor Laboratory Press; 2 edition S by C. David Allis, Marie-Laure Caparros, Thomas Jenuwein , Danny Reinberg.
3. *《The Biology of Cancer》*, Second Edition，Robert A. Weinberg，Garland Science

Expected level of proficiency from students entering the course:

Mathematics and statistics: medium
Computer programming: medium
Molecular biology: medium
Genetics: entry level
Cell biology: entry level
Math: Basic calculation

Course title

Plant Molecular Biology and Genomics

Instructor(s)-in-charge:

Profs. Hai-Chun Jing, Rong-Cheng Lin, Ya-Long Guo, Lei Wang

Course type:

Lecture

Course Schedule:

4hrs/week by instructors

Course Assessment:

Homework: 15 assignments

Grading Policy:

Typically 40% homework, 20% attendence, 40% final.

Course Prerequisites:

without

Catalog Description:

This course invites lab bench-based researchers from Institute of Botany, Chinese Academy of Sciences, to share their cutting-edge knowledge of Plant Molecular Biology and Genomics. The course will explain the concept of the gene, genome and epigenome, and theories and experimental tools/platforms to explore their variations, functions, interactions and regulatory networks in the context of plant speciation and evolution, growth and development as well as adaptation to the environments. Emphasis will also be given to how to translate know-hows gained from the basic science into plant breeding. The course puts more weight into how to rationalize, design and execute scientific researches, rather than to spoon feed the attendees with jargons to memorize. We encourage actively answer-seeking rather than rote learning, do require the attendees to have ideally at least college-level education in Plant Biology and relevant fields.

Schedule of the course

Section	Content	Hours	Date	Tutor
1	The Gene, Genome and Epigenome in Plants, Plant Sciences and *Science* 125 questions	12	September 14 September 21 September 28	Hai-Chun Jing
2	Plant Genome Biology and Evolution	12	October 12 October 19 October 26	Ya-Long Guo
3	Molecular Biology of Photo-morphogenesis and Light Signaling	8	November 2 November 9	Rong-Cheng Lin
4	Plant Circadian Molecular System and Epigenetic Controls	12	November 16 November 23 November 30	Lei Wang
5	Molecular Biology and Genomics for Plant Breeding	12	December 7 December 14 December 21	Hai-Chun Jing
6	Q&A	4	December 28	Hai-Chun Jing

total		60		

Contents of the course

Section 1: The Gene, Genome and Epigenome in Plants (Hai-Chun Jing)

1. The Gene

- **The Missing Science of Heredity**
- **The Dreams of Genetists**
- **Plant Genetics**

2. The Genome

- **The Spacious Genome**
- **RNA out of the Shadows**
- **Code, Non-Code, Garbage, and Junk**

3. The Epigenome

- **The Discovery of Epigenetics**
- **DNA Methylation**
- **Histone Modifications**
- **Chromatin Remodelling**
- **Interactions between Different Epigenetic Modifcations**

Section 2:Plant Genome Biology and Evolution（Ya-Long Guo, three afternoons）

- **Genome sequencing and genomics**
- **Comparative genomics**
- **Population genomics and adaptive evolution**

Section 3: Molecular Biology of Light Signaling and Photomorphogenesis (Rong-Cheng Lin, two afternoons)

- **Light and plant development**
- **Photoreceptors: light perception**
- **Light signaling transduction**
- **Photo morphogenesis**

Section 4: Plant Circadian Molecular System and Epigenetic Controls (Lei Wang, three afternoons)

- **Plant circadian molecular system (Concept, assembly of core oscillator)**
- **Regulation of circadian clock core oscillator**
- **Circadian clock and plant development**

Section 5: Molecular Biology and Genomics for Plant Breeding (Hai-Chun Jing)

- **Crop Domestication and Plant Genetic Resources**
- **Plant Biotechnology and Moelcular Breeding**
- **Future of Plant Breeding**

Textbook and any related course material

1. Epigenetics, edited by Allis CD, Jenuwein T and Reinberg D, Caparros ML (editor-in-chief), Cold Spring Harbor Laboratory Press, New York.

2. Genes Ⅷ, Benjamin Lewin.

3. Genomics of tropical crop plants: Moore PH, Ming DR. Sringer, 2008.

4. Plant Genomics: Methods and Protocols. Daryl J. Somers DJ, PeterLangridge, J.P. Gust. Humana Press Inc.2011.

5. Plant Genomics: Methods and Protocols. Busch.Humana Press Inc. 2017.

Course title

Biophysics and Organelle Biology

Instructor(s)-in-charge:

Prof. Pingsheng Liu

Course type:

Lecture

Course Schedule:

See Schedule of the course

Course Assessment:

Homework: 7 assignments

Grading Policy:

70% homework, 30% classroom activities.

Course Prerequisites:

Without

Catalog Description:

1. **Introduction of Biophysics**
   Definition; Contents
2. **Macromolecules**
   Functions; Regulation; Structure
3. **Cellular structures and organelles**
   Cytoskeletons; Organelles
4. **Lipid Storage Disorders and Metabolic Diseases**
   Cardiovascular disease; None alcoholic fatty liver disease
5. **Introduction of Lipid Droplets**
   History; Distributions; Difference with lipoproteins and other cellular organelles; Recent progress; Uncertainty and problems; Future studies
6. **Structural Proteins and Protein Composition**
   Structural Proteins: PLINs; Oleosins; MPL, MLDP, MLDS, LDP, CLDPs
   Protein Composition: Lipid synthetic and catalytic; Membrane trafficking; Signaling; Protein degradation
7. **Formation and Functions**
   Formation: Biogenesis; Growth and degradation; Fusion and fission
   Functions: Storage; Trafficking (movement and interaction with other cellular organelles); Lipid synthesis; Signaling; Protein degradation; DNA protection
8. **Lipid Droplets in Mammals and Other Organisms**
   Mammals: Adipose tissue; Mammary gland; Liver; Macrophages; Lymphocytes; Muscle; Other mammalian cells
   Plants: Plant seeds; Chloroplasts
   Genetic Model Organisms: Drosophila; C. elegans
   Microorganisms: Yeast; Green algae; Bacteria
9. **Lipid Droplet Evolution**
   Origin; Conserved properties
10. **Methods in Lipid Droplet Biology**
    Isolation; Proteomics; Imaging; Fusion; Fission; Movement; Genetic screen;

Artificial lipid droplets

Course material:

All references are list in course ppt.

You are welcome to copy the ppt.

Course title

Fundamental Immunology

Instructor(s)-in-charge:

Prof. Min Fang & Assoc Prof. Xuefeng Duan

Course type:

Lecture

Course Schedule:

4hrs/week by instructors. 32 hrs in total by Prof. Min Fang; 8 hrs in total by Assoc Prof. Xuefeng Duan.

Course Assessment:

Homework: 5 assignments

Grading Policy:

Typically 50% homework, 20% attendances; 30% final presentation.

Course Prerequisites:

Immunology, Cell Biology, Microbiology，Virology

Catalog Description:

Fundamental Immunology is designed as a comprehensive course of immunology for research postgraduates in biology field. The class will give students a general view of immunology and some detailed development in certain selected area of immunology. As a course for postgraduates research case studies are incorporated into the course to provide examples for researches carried out in respective fields. This course covers the components of the immune system, Innate immunity, the cell biology of antigen processing and presentation, antibody and B cells, T cell response, the molecular structure and assembly of MHC molecules, and the pathogenesis of immunologically mediated diseases and immune system as defense system against infectious disease and tumor, and immunology as tool for general biology including antibody technology and flow cytometry. The course is structured as a series of lectures and mini-seminars in which individual research cases are discussed with faculty tutors. It will cover the following topics:

Schedule of the course

section	content	hours	Date
1	**Introduction of Immunology** Introduction to Immunology; General Properties of Immune Responses; Cells and Tissues of the Immune Systems; The development stages of Immunology.	4	September 11 Prof. Min Fang
2	**Innate Immunity** Features of Innate Immune Recognition; Components of the Innate Immune System; The Intersection of Innate and Adaptive Immunity	4	September 18 Prof. Min Fang
3	**NK cell development and function** General properties of NK cells; NK cell development and differentiation; NK cells in	4	September 25 Prof. Min Fang

	anti-viral immunity; Memory NK cells		
4	**Immunoglobulins and B lymphocytes** Immunoglobulins: Structure and Function; Antigen-antibody interactions and Monoclonal Antibody; B lymphocytes Development and Biology; B lymphocytes Signaling Mechanisms and Activation.	4	October 09 Prof. Min Fang
5	**T lymphocytes** T cell Antigen Receptors; T lymphocyte Signaling Mechanisms and Activation; Development of T cells; Peripheral T lymphocyte responses and Function.	4	October 16 Prof. Min Fang
6	**Major Histocompatibility Complex (MHC) Molecules and Antigen Presentation** MHC Structure, Function, and Genetics; Cell Biology of Antigen Processing and Presentation.	4	October 23 Prof. Min Fang
7	**Immunity to infectious Agents** The Immune Responses to Parasites and bacteria; Immunity to Viruses; Vaccines; Research case study.	4	October 30 Prof. Min Fang
8	**Immunologic Tolerance and Autoimmunity** B lymphocyte tolerance, and tolerance induced by foreign protein antigens; T lymphocyte tolerance; Mechanisms of autoimmunity; Advances in immunologic tolerance and autoimmunity	4	November 06 Assoc Prof. Xuefeng Duan
9	**Immunity to Tumors** Overview and tumor antigens; Immune responses to tumors and evasion of immune responses by tumors; Immunotherapy for tumors and the role of innate and adaptive immunity in promoting tumor growth; Advances in immunity to tumors	4	November 13 Assoc Prof. Xuefeng Duan
10	**Students Final Presentation** 3-5 minutes per student, the student can choose any topic in immunology and discuss their understanding and thoughts.	4	November 20 Prof. Min Fang
total		40	

Contents of the course

Section 1: Introduction of Immunology and Innate Immunity

1. Introduction of Immunology;
2. Cells and Tissues of the Immune Systems;
3. The development stages of Immunology
4. Features of Innate Immune Recognition;
5. Components of the Innate Immune System;
6. NK cells: General properties of NK cells; NK cell development and differentiation; NK cells in anti-viral immunity; Memory NK cells

Section 2: Adaptive Immunity

1. Humoral Immunity: Immunoglobulins: Structure and Function; Antigen-antibody interactions and Monoclonal Antibody; B lymphocytes evelopment and Biology; B lymphocytes Signaling Mechanisms and Activation.
2. Cellular Immunity: T cell Antigen Receptors; T lymphocyte Signaling Mechanisms and Activation; Development of T cells; Peripheral T lymphocyte responses and Function.
3. Antigen Presentation: MHC Structure, Function, and Genetics; Cell Biology of Antigen Processing and Presentation.

Section 3: Immune Systems and Diseases

1. Immunity to infectious Agents: The Immune Responses to Parasites and bacteria; Immunity to Viruses; Vaccines; Research case study.
2. Immunologic Tolerance and Autoimmunity: B lymphocyte tolerance, and tolerance induced by foreign protein antigens; T lymphocyte tolerance; Mechanisms of autoimmunity; Advances in immunologic tolerance and autoimmunity.
3. Immunity to Tumors: Overview and tumor antigens; Immune responses to tumors and evasion of immune responses by tumors; Immunotherapy for tumors and the role of innate and adaptive immunity in promoting tumor growth; Advances in immunity to tumors

Textbook and any related course material:

Cellular and Molecular Immunology, 8th Edition, Edited by Abul K .Abbas, Andrew H. Lichtman, and Shiv Pillai

Fundamental Immunology, 7th Edition, Edited by Paul, William E.

Principles of Virology, 3rd Edition, Edited by S.J. Flint, L.W. Enquist, V.R. Racaniello, A.M. Skala

Expected level of proficiency from students entering the course:

Cell Biology: strong

Immunology: basic

Virology: basic

Course title

Model Animals in Developmental Biology

Instructor:

Prof. YUAN Li

Course description:

The goal of this course is to introduce postgraduate students to the field of animal developmental biology, and to help them understand how the choice of model organisms matters for their research.

Topics related to growth, differentiation, morphogenesis and organogenesis in different model animals would be covered. Using genetic and molecular biological techniques, developmental biologists have moved beyond animal developmental anatomy and now study the causal mechanisms of development using a number of invertebrate and vertebrate model organisms. Thus, animal developmental Biology has a rich and fascinating history as people, events, and disciplines coalesced to form the field. It continues as one of the most rapidly expanding areas of biological research.

Course type:

Lecture, mini-seminar, discussions

Notes:

PowerPoint slides for each lecture will be sent to you in advance. During the lecture period, you will be presented with a series of discussion questions. These questions are designed to challenge you to think critically about the principles of animal developmental biology. The goal of these questions is to introduce you to the process of interpreting scientific data as well as the experimental paradigms that form the foundation of developmental biology. I will benefit from these questions by gaining feedback about your level of understanding of the presented concepts, and you can in turn use these discussion questions to gauge your own grasp of the material.

Studying developmental biology is rigorous and demanding, but the rewards can be great. I look forward to learning with you.

Grading information:

Components of Model Animals in Developmental Biology will be worth the following percentages of your total grade:

Homework assignments: 20%

Discussion questions: 20%

Attendance: 10%

Final open-book examination: 50%

Schedule of the course

Chapter	Content	Hours	Date
1	Introduction to model animals in developmental biology	4	Sep.11
2	Studying developmental biology – tools and techniques	4	Sep.18
3	Introducing animal embryonic development	4	Sep.25

4	Cell-cell communication in development	4	Oct.9
5	Germ cells, fertilization and sex determination	4	Oct.16
6	Early *Drosophila* development and genes that pattern the *Drosophila* body plan	4	Oct.23
7	Early amphibian development	4	Oct.30
8	Early zebrafish development	4	Nov.6
9	Early development in chickens	4	Nov.13
10	Early mammalian development	4	Nov.20
11	Early development in *C. elegans*	4	Nov.27
12	Development of the nervous system Section 1: The Emergence of the Ectoderm: central nervous system and epidermis Section 2: The neural crest cells and axonal specificity	8	Dec.4 Dec.11
13	Organogenesis: (1) Paraxial mesoderm: somitogenesis (2) Intermediate mesoderm: the urogenital system	4	Dec.18
	Repetition; Open-book examination	4	Dec.25
Total		60	

Course title

Plant Physiology and Developmental Biology

Instructor(s)-in-charge:

Prof. CHENG Youfa

Course type:

Lecture, mini-seminar, discussions

Catalog Description:

This course is designed as an introduction course of plant physiology and developmental biology for graduate students. In this course, we will discuss plant physiology and developmental events during plant life and the underlying mechanisms controlling such plant developmental processes and responses to environmental stimuli. Emphasis will be given on the molecular genetic basis of the developmental events. The entire life span will be examined, from gametocyte development to embryogenesis and post-embryonic development, such as root, leaf, flower and fruit development. Hormones and signal transduction will also be discussed.

It will cover the following topics:

Schedule of the course

section	content	hours	Date
1	Introduction to Plant Physiology and Developmental Biology	4	Sept-10
2	Methods in Plant Physiology and Developmental Biology I	4	Sept-17
3	Methods in Plant Physiology and Developmental Biology II	4	Oct-8
4	Hormone and Signal Transduction in Plants I	4	Oct-15
5	Hormone and Signal Transduction in Plants II	4	Oct-22
6	Embryogenesis I	4	Oct-29
7	Embryogenesis II	4	Nov-5
8	Stem Cell and Meristem I	4	Nov-12
9	Stem Cell and Meristem II	4	Nov-19
10	Organogenesis I	4	Nov-26
11	Organogenesis II	4	Dec-3
12	Flowering and Flower Development I	4	Dec-10
13	Flowering and Flower Development II	4	Dec-17
14	Stress physiology	4	Dec-24
15	exam	4	Dec-31
total		60	

Course title

Environmental and Natural Resource Economics

Instructor(s)-in-charge:

Prof. DENG Xiangzheng

Course type:

Lecture

Course Schedule:

3hrs/week by instructor. 1 hr/week by teaching assistant.

Catalog Description:

Environmental and Natural Resource Economics 2018 fall semester is designed for research postgraduates in Environmental Sciences field. The class will give students a general view of environmental and natural resource economics and some detailed development in certain selected areas. As a course for research students, a mini-seminar series are incorporated into the course to provide examples for researches carried out in respective fields. This course covers the components of the environmental economics and natural resource utilization analysis and research, their key definitions and research approaches, economics of natural science based environmental changes and assessment, natural resources categories and their scientific issues, issue-oriented analysis and discussion of environmental justice and sustainable development, etc. The course is structured as a series of lectures and mini-seminars, in which individual research cases are discussed with faculty tutors. It will cover the following topics:

Schedule of the course

Section	Content	hours	Date
1	**The Economic Approach** 1.1 The Human–Environment Relationship: -the role of economics; -studying human behavior in a laboratory; -the environment as an asset. 1.2 Environmental Problems and Economic Efficiency: -property rights and efficient market allocation; -improperly designed property rights systems; -the pursuit of efficiency. 1.3 Externalities as a Source of Market Failure: -public goods; -imperfect market structures; -government failure; -an efficient role for government.	4	September 11
2	**Evaluating Trade-Offs** 2.1 Normative Criteria for Decision Making: -pollution control; -preservation *versus* development; -issues in benefit estimation. 2.2 Approaches to Cost Estimation: -the Treatment of Risk; -distribution of benefits and costs; -choosing the discount rate; -divergence of social and private discount rates; -cost-effectiveness analysis; -impact analysis.	8	September 18 September 25

	2.3 Valuing the Environment: -identification of types of values of environment; -classification of valuation methods; -preference based models (stated preference, revealed preference, travel cost, hedonic property and wage, averting expenditure). 2.4 GIS based modeling works: -examples and practices.		
3	**Dynamic Efficiency and Sustainable Development** 3.1 Efficiency vs Equality: -a two-period model; -defining intertemporal fairness; -efficient allocations and sustainability criterion. 3.2 Sustainable Development: -market allocations; -efficiency and sustainability; -trade and environment. 3.3 Environmental Policy for Sustainable Development: -implications for environmental policy; -depletable resource allocation; -efficient intertemporal allocation; -market allocation of depletable resource.	8	October 9 October 16
4	Student presentations and discussions	4	October 23
5	**Replenishable but Depletable Resources: Water** 5.1 The Potential for Water Scarcity: -the efficient allocation of scarce water; -water transfers; -water markets; -water prices; -GIS and water resource. 5.2 Watershed based efficiency and cost-effectiveness: -nature of water pollution problem; -water pollution control. 5.3 Mini-seminars: -group discussions	4	October 30
6	**A Locationally Fixed, Multipurpose Resource: Land** 6.1 The Economics of Land Allocation: -land use; -land use conversion; -examples and practices. 6.2 Efficiency of land use: -sources of inefficient use and conversion; -innovative market-based policy remedies; -establishing property rights; -transferable development rights. 6.3 Mini-seminars: -group discussion.	8	November 6 November 13
7	**Reproducible Private Property Resource: Agriculture and Food Security** 7.1 Global Scarcity and food security: -outlook for the future; -the role of agricultural policies; -distribution of food resource. 7.2 Climate changes and food security:	4	November 20

	-feast and famine cycles; -examples and summary, 7.3 Mini-seminars: -group discussion.		
8	Student presentations and discussions	4	November 27
9	**Land Storable, Renewable Resources: Forests** 9.1 Sources of Inefficiency: -perverse incentives for the landowner and nations; -poverty and debt; -sustainable forestry. 9.2 Public Policy: -carbon sequestration credits; -REDD. 9.3 Mini-seminars: -group discussion.	4	December 4
10	**Economics of Pollution Control** 10.1 The Efficient Allocation of pollution: -a pollutant taxonomy; -market allocation of pollution; -efficient policy responses. 10.2 Policy Analysis: -cost-effective policies for uniformly mixed fund pollutants: -cost-effective policies for nonuniformly mixed surface pollutants: -responses to changes in the regulatory environment; -price volatility; -instrument choice under uncertainty; -product charges as an indirect form of environmental taxation. 10.3 Air Pollutions: -conventional pollutants; -cost-effectiveness of the command-and-control approach; -innovative approaches; -regional pollutants. 10.4 Mini-seminars: -group discussion.	4	December 11
11	Student presentations and discussions	4	December 18
12	**Course conclusion and discussion**	2	December 25
13	**Final Exam**	2	December 25
Total		60	

Course title

Climate Change Science

Instructor(s)-in-charge:

Prof. KANG Shichang et al.

Course type:

Lecture

Grading Policy:

Part one: Attendance (20%)

Part two: Presentation (30%)

Part three: Final Exam (50%)

Catalog Description:

*Climate Change Science 2018 fall semester is designed as an introductory course in the **climate system change and related Issues** for graduate students majored in Earth Sciences. The class will give students an overview of climate system and its changes and impacts, mitigation and adaptation of climate changes as well as some updated developments in selected fields. As a course for graduate students a mini-seminar series are incorporated into the course to provide examples of research conducted in selected fields. This course covers the components of the climate system including atmosphere, cryosphere, hydrosphere, biosphere, anthroposphere, and their changes as well as mechanisms, forcing, attribution and predictions of the changes, multisphere interactions in Earth surface. Impacts, mitigation and adaptation of climate changes and regional and global sustainable development are also introduced. The course is structured as a series of lectures and mini-seminars in which individual research cases are discussed with faculty tutors.*

Schedule of the course and contents

Section	Content	hours	Date
1	**Overview of Climate Change** 1.1 Weather, climate and climate System 1.2 What has hanged 1.3 Why has it changed 1.4 How will it change	8	Sept. 10 Sept. 17 S. Kang
2	**Paleo-climate Change** 2.1 Glacial and interglacial cycle 2.2 Holocene 2.3 Past 2000 yeas 2.4 Anthropocene	4	Oct. 8 Q. Zhang
3	**Changes in Atmospheric Composition** 3.1 Well mixed greenhouse gases 3.2 Short lived gases 3.3 Aerosols and precurses 3.4 Toxic species	8	Oct. 15 Oct. 22 Q. Zhang
4	**Changes in Climate extremes** 4.1 Temperature extremes 4.2 Precipitation extremes 4.3 Tropical storms	4	Oct. 29 Q. You

5	**Changes in Atmospheric Circulation** 5.1 Global atmospheric circulation 5.2 Stratospheric circulation 5.3 Mid to high latitude circulation (jets) 5.4 Tropical circulation (Hadly cycle, ENSO) 5.6 Monsoon system 5.7 Climate pattern	8	Nov. 5 Nov. 12 Q. You
6	**Changes in the Cryosphere** 6.1 Glacier 6.2 Ice sheet 6.3 Permafrost 6.4 Seasonal snow 6.5 Sea ice 6.6 Other ice	4	Nov. 19 S. Kang
7	**Changes in Hydrological Cycle** 7.1 Precipitation 7.2 Streamflow and runoff 7.3 Evapotranspiration including Pan Evaporation 7.4 Surface and tropospheric humidity 7.5 Clouds	4	Nov. 26 L. Cuo
8	**Modeling Climate Change and Prediction** 8.1 Aerosol and clouds 8.2 Anthropogenic and natural radiative forcing 8.3 Detection and attribution of climate change 8.4 CMIP5 8.5 Regional climate model 8.6 Climate change prediction	8	Dec. 3 Dec. 10 Z. Ji
9	**Impacts, Vulnerability of Climate Change** 9.1 Assessment methods of impacts and vulnerability 9.2 Major fields of impacts and vulnerability 9.3 Major regions of impacts and vulnerability 9.4 Resilience in response to climate change	4	Dec. 17 X. Wang
10	**Mitigation and Adaptation of Climate Change** 10.1 Mitigation approaches 10.2 International policies for mitigation 10.3 Adaptation under sustainable development	4	Dec. 24 X. Wang
11	**Student Presentation and seminar**	4	Dec. 31 S. Kang
Total		60	

Course title

Earth System Science Part I-Introduction to Remote Sensing

Instructor(s)-in-charge:

Prof. Fang Chen

Course type:

Lecture

Course Schedule:

Mondays from 13: 30 - 17:10 p.m.

September 10, 2018 September 17, 2018 October 8, 2018
October 15, 2018 October 22, 2018 October 29, 2018
November 5, 2018

Course Assessment:

Homework: 2 assignments

Grading Policy:

The grading for this course will be based on:
- Participation (30% of grade)
- Assignments (30% of grade)
-Short presentation (20% of grade)
-Comprehensive final exam (20% of grade)

**Participation in lectures, discussions, and other activities is an essential part of the instructional process. Students are expected to attend class regularly. Those who are compelled to miss class should inform the instructor of the reasons for absences. Unexcused late assignments will have at a minimum 5 points deducted. To avoid this penalty you must contact the instructor prior to the due date. Students will freely form a group (including maximum 3 members in each group) and each group is expected to give a group presentation on the topical area of Assignment-2 in front of the class. The presentation will be followed by discussion during which other students are expected to ask questions and engage. The group presentations will be limited to 10 minutes and Q&A will be limited to 5 minutes (depend on the number of students). Students will be graded both as presenters and participation in discussion.*

Course Prerequisites:

This course does not have any pre-requisites.

Catalog Description:

This course is intended to provide an introduction to remote sensing, with particular attention to the role of remote sensing for the monitoring the Earth's land surface. It will introduce the basic principles of image interpretation, remote sensing, and digital data processing in relation to optical, thermal, and microwave remote sensing systems. Examples of remote sensing applications will be resented along with methods for obtaining quantitative information from remotely sensed imagery.

Writing Assignments and Group Presentation

1. *Assignment-1-- Write a short (3-4 page) paper on **a topic of your understanding of remote sensing** related to the class subject matter. DUE in class, October 8.*
2. *Assignment-2-- Write a short (3-4 page) paper on the topic of **the use of remote sensing for disaster management**. DUE in class, November 5.*

3. *Group Presentation--Students will freely form a group (including maximum 3 members in each group) and each group is expected to give a group presentation on the topic of the use of remote sensing for disaster management. Each group should send the group members' information (i.e., Name and Student ID) to teaching assistant* ***due in October 16****.*

Keys to Success:

This course is challenging for many students because of the highly quantitative nature of the field of remote sensing. In order to assist all students in the course, I have identified several keys to success in this course:

1. *Attend all lectures which are critical components of this class. Attending lecture will make the difference of an entire grade.*
2. *Read the assigned text chapters/sections before coming to class.*
3. *During lectures, focus on listening to the material being presented and synthesizing this information by taking notes that summarized the key points.*

Schedule of the course

Section	Content	Date	Readings	Assignments Due
1	*Introduction to Remote Sensing*	*September 10*	*-Ch.1,3*	
2	*Image Processing/RS Applications*	*September 17*		
3	*Remote Sensing for Disaster Management*	*October 8*		*Assignment-1 due by beginning of class*
4	*Remote Sensing of Vegetation-Spectral/Temporal Characteristics, Indices, and Change Detection*	*October 15*	*-Ch.11,12*	
5	*Remote Sensing of Water, Soil, and Urban Areas*	*October 22*	*-Ch.13,14*	
6	*Students presentation*	*October 29*		
7	*Students presentation*	*November 5*		*Assignment-2 due by beginning of class*

Textbook and any related course material:

Jensen, J. R., 2007, Remote Sensing of the Environment: An Earth Resource Perspective. Prentice Hall series in Geographic information Science, NJ. (ISBN: 0-13-188950-8)

Essay Template

TITLE: ESSAY TEMPLATE FOR THE INTRODUCTION TO REMOTE SENSING COURSE (TITLE IN CAPS, 12PT BOLD CENTERED)

First Author[1,2] (10pt bold centered)

[1] *Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, China*

[2] *Voeikov Main Geophysical Observatory, Roshydromet, Russian Federation (10pt italicized centered)*

Abstract Summary: This section should briefly summarize the main contents of your essay. Recommended length is 10 lines using Time New Roman 9pt.

Keywords: *Disaster, Flooding (9pt in italics, maximum five words)*

1. INTRODUCTION (headline in CAPITALS, 10pt Bold)

In order to have a similar format for all essays in the assignments, we are offering some recommendations to the authors for composing their essay.

The essay should be in A4 format with page margins of 25 mm on the left and right sides and 25 mm on the top and bottom. The maximum allowed length is 4 pages. Pages must not be numbered. The first page must begin with the essay title in capital letters, centered. Authors' name and affiliations must appear just below the title. A summary and keywords should directly follow.

The text should be divided in several sections, and main contents includes: 1) natural hazard and disaster mitigation in your country or region; 2) the development of remote sensing technology in your country or region; 3) your opinion on technologies that might significantly improve current disaster mitigation in your country or region, 4) challenges and recommendations of advancing disaster risk management with remote sensing technologies in your country or region.

The title of each section should be in capital letters. The text must be in a single column format. For the body, the text must be single-spaced and justified, using Times New Roman font. Font sizes are specified at various locations. It should be structured in paragraphs; each new paragraph should begin with an indent without an empty line between paragraphs. The paper should be written in English.

Tables and figures could be added in your essay. A caption must be provided for each table and figure you choose to include. Captions should be below the figures/tables and must be numbered (Tab. 1; Fig. 1).

References will appear at the end of the extended abstract. Given size constraints, only limited key references need to be included. List all citations alphabetically in the reference section. Two examples of citations are given in this document (Bougeault et al. 2001, Schwitalla et al. 2007).

Table 1 Most meaningful example of a data table with columns and lines filled with a minimum of quantitative information
(Table entries in 10pt; caption in 9pt).

Test Table	Column 1	Column 2	Column 3	Column 4
Line 01	1	2	3	4
Line 02	5	6	7	8

Line nn				

Figure 1 Two photos of polar bears. Left: Figure explanation; Right: Figure explanation (9pt)

2. NATURE HAZARDS AND DISASTER MITIGATION IN YOU COUNTRY (headline in CAPITALS, 10pt Bold)

3. REMOTE SENSING IN YOUR COUNTRY (headline in CAPITALS, 10pt Bold)

4. TECHNOLOGIES REQUIREMENT FOR… (headline in CAPITALS, 10pt Bold)

To reduce risk and vulnerability, to mitigation the effects of natural disaster, and to improve rescue operations, we must use science and technology to explore the potentially positive aspects...

5. CHALENGES AND RECOMMENDATIONS… (Headline in CAPITALS, 10pt Bold)

Provide a scientific and practical guide to Academies of Sciences, with example of good practices in implementing mitigation risk with remote sensing. ...

6. SUBMISSION OF ESSAY

The extended essay should be produced with MS-Word. **Note that if you do not submit your essay, it will not appear in the Final Scores.** Please use the following naming convention to help ease the compilation of the Volume of Essay:

```
Surname Firstname (You Student ID).doc
```

Acknowledgements: *(9pt italics)*

I thank all …

REFERENCES (in 9pt; second line indented for better distinction)

Bougeault, P., P, Binder, A. Buzzi, R. Dirks, R. Houze, J. Kuettner, R. B. Smith, R. Steinacker, and H. Volkert, 2001: the MAP Special Observing Period. *Bull. Amer. Meteorol. Soc.* **82**, 433-462.

Schwitalla, T., G. Zangl, H. S. Bauer, and V. Wulfineyer, 2007: Convective initiation in the Black Forest region in high-resolution MM5 simulations. *Proc. 29th Intern. Conf. on Alpine Meterology*, Chambery, France, 261-264.

Course title

Earth System Science Part II-Earth System Dynamics

Instructor(s)-in-charge:

Prof. JIA Gensuo

Course type:

Lecture

Course Schedule:

Once a week from November 12 to December 31, 2018

Course Assessment:

Homework: 4 assignments

Grading Policy:

The grading for this course will be based on:

- Participation (30% of grade)
- Assignments (40% of grade)
-Comprehensive final exam (30% of grade)

Course Prerequisites:

Preferred but not required: Ecology, environmental sciences, climate science

Catalog Description:

This course focuses on patterns and variability of the Earth system. It addresses a number of fundamental science questions. How does the Earth system operate in the absence of significant human influence? How do human-driven processes shape land surface and climate system as addition to those due to natural variability? What are the implications of global change for human well-being? How robust is the Earth System in the face of natural and anthropogenic changes? The course covers various aspects of our scientific knowledge about the nature of the Earth system and global environmental change, and includes the following sections: 1) Spatial patterns and temporal variability of the Earth system; 2) Heterogeneity and connectivity of the Earth system; 3) Human dominated changes in global environment; 4) Land surface and terrestrial ecosystem processes; 5) Interactive changes of land-use, ecosystem, and climate; 6) Disaster risks under changing climate; 7) Earth observation of global environmental change. To encourage involvement and interaction, international students will also be given opportunity to discuss ways towards a sustainable Earth system with their local, national, and regional perspectives at a well-designed science-policy forum.

Schedule of the course

section	content	hours	Date
1	Spatial patterns and temporal variability of the Earth system	4	November 12
2	Heterogeneity and connectivity of the Earth system	4	November 19
3	Human dominated changes in global environment	4	November 26
4	Land surface and terrestrial ecosystem processes	4	December 3
5	Interactive changes of land-use, ecosystem, and climate	4	December 10
6	Disaster risks under changing climate	4	December 17

7	Earth observation of global environmental change	4	December 24
8	Science-policy forum: towards a sustainable Earth system	4	December 31
total		32	

Textbook and any related course material:
Steffen, W., A. Sanderson. P.D. Tyson, et al. 2004
Global Change and the Earth System
Springer. 336 pp

Shugart, H.H. and F.I. Woodward. 2011.
Global Change and the Terrestrial Biosphere: Achievements and Challenges,
Wiley-Blackwell Press, Oxford. 242 pp

Relevant science journals:
http://green.tea.ac.cn/Journals.html

Global and Planetary Change, 0921-8181
Global Change Biology, 1354-1013
Global Ecology and Biogeography, 0960-7447
Global Environmental Change - Human and Policy Dimensions, 0959-3780
Remote Sensing of Environment, 0034-4257

Course title

Introduction to Geodynamics

Instructor(s)-in-charge:

Prof. WANG Shimin

Course type:

Lecture

Course Schedule:

4hrs/week by instructor.

Course Assignments:

Homework: 8 assignments

Grading Policy:

20% class attendance, 40% homework, 40% final report.

Course Prerequisites:

Calculus, general physics

Catalog Description:

This course will introduce the field of geodynamics, the study of dynamical processes of the solid Earth. As such, it is rooted in fundamental physics and highly interdisciplinary. Mathematics is the central tool used to apply physical theories and create predictive models of the Earth. Geodynamics provides the quantitative foundation for the theory of Plate Tectonics, the basic organizing paradigm for our understanding of the solid Earth.

Schedule of the course

section	content	hours	Date
1	Plate tectonics	8	September 13 September 20
2	Stress and strain in solids	4	September 27
3	Elasticity and flexure	4	October 11
4	Heat transfer	8	October 18 October 25
5	Gravity	4	November 1
6	Fluid mechanics	8	November 8 November 15
7	Rock rheology	4	November 22
8	Faulting	4	November 29
9	Flows in porous media	4	December 6
total		48	

Contents of the course

Section 1: Plate tectonics

1. Origin of the theory of plate tectonics
2. Types of plate boundary
3. Plate motion models
4. Comparative Planetology

Section 2: Stress and strain in solids

5. Concepts of stress and strain

6. Measurements of crustal stress and strain

Section 3: Elasticity and flexure

7. Linear elasticity
8. Thin plate bending and applications to lithospheric flexure
9. Thickness of elastic lithosphere

Section 4: Heat transfer

10. Heat transfer in solid earth
11. Heat conduction and Fourier's law
12. Thermal structure of lithosphere
13. Thermal structure of mantle

Section 5: Gravity

14. Fundamentals of gravity
15. Gravity anomalies

Section 6: Fluid mechanics

16. Solutions to simple fluid flow problems and applications in geosciences
17. Stokes flows and mantle plume modeling
18. Thermal convection
19. Simple models for mantle convection

Section 7: Rock rheology

20. Microscopic mechanisms for rock rheology
21. Rock viscosity
22. Rock viscoelasticity and plasticity

Section 8: Faulting

23. Types of faulting
24. Frictional laws for faulting
25. Fault elastic rebound and earthquake
26. Solutions to simple faulting problems

Section 9: Flows in porous media

27. Darcy's law
28. Solutions to porous flows
29. Thermal convection in porous media

Textbook:

Geodynamics, D.L. Turcotte & J. Schubert, 3rd Edition, Cambridge University Press, 2014.

Course title

Materials Production and Environmental Sciences

Credits: 4

Instructor(s)-in-charge:

Prof. Hao Du

Course type:

Lecture

Course Schedule:

Listed in the table below.

Course Assessment:

Homework: 10 assignments, will be given after each class, extensive literature reading is expected.

Grading Policy:

Assignments 40%, Final 20%, Presentation 20%, Attendance 20%

Course Prerequisites:

College Chemistry, College Mathematics, English.

Catalog Description:

This course includes two sections. First, the introduction of different processes to recover some of the more important industrial materials; Second, introduction of the environmental issues involved in different metal recovery processes, and the methods for the pollution control. Emphasis will also be given to the clean production related to industry application.

It is expected that after taking this course, students will be familiar with most common metallic materials production processes and environmental issues related.

Schedule of the course

section	content	hours	Date
1	Overview	4	September 10
2	Steel production	4	September 17
3	Aluminum production	4	October 8
4	Titanium production	4	October 15
5	Gold and silver production	4	October 22
6	Copper production	4	October 29
7	Lead and Zinc production	4	November 5
8	Chromium and manganese production	4	November 12
9	Potassium and lithium production	4	November 19
10	Rare earth metals production	4	November 26
11	Urban mining	4	December 3
12	Wasted battery recovery	4	December 10
13	Metals and energy storage	4	December 17
14	Student presentation	4	December 24
15	Summary and highlights	4	December 31
total		60	

Contents of the course

Textbook and any related course material:

No textbook, and electronic course reading materials will be provided one week before each class.

Course title

Multi-Phase Chemical Reaction Engineering and Technology

Instructor(s)-in-charge:

Prof. Xiaoxing Liu, Associate Professor Bona Lu

Course type:

Lecture

Course Schedule:

From Sep. 14 to Dec. 14, twelve times

Course Assessment:

Homework: 8 assignments

Grading Policy:

Typically 40% homework, 30% each midterm, 30% final.

Course Prerequisites:

Be familiar with the basic knowledge of multi-phase (gas, liquid, solid) system and transport phenomena.

Catalog Description:

Multi-phase systems such as gas-solid, liquid-solid, gas-liquid-solid systems are commonly encountered in a variety of chemical engineering processes. For the proper design, operation and optimization of chemical equipments handling multi-phase flows, it is critical to get a basic understanding of the hydrodynamic, mass- and thermal transfer, and reaction characteristics of multi-phase systems. This course will be started with an overview of the multi-phase systems and summarizing the history of their research and developments, followed by a general introduction of the characterization and classifications of multi-phase flow phenomena. The heaviest parts of this course will be contributed to the introduction of the hydrodynamic, mixing and heat transfer phenomena occurred in the multi-phase reactors, and also the related measurement techniques and instrumentation. Various applications of multi-phase reactors will also be addressed and discussed.

Schedule of the course

section	content	Hours
1	Mole balances and conversion	4
2	Rate laws	4
3	Preliminary Reactor design	4
4	Distributions of residence times	4
5	Gas-solid Fluidized Bed---A General Review	4
6	General introduce of powder/granular assembly	4
7	particle characterization and fluid (particle)-particle interaction	4
8	Dense Fluidization 1	4
9	Dense fluidization 2	4

10	CFB & Design Criteria	4
11	Mass and heat transfer	4
12	Numerical simulations of multi-phase systems	4
total		48

Textbook and any related course material:

Fogler H. Scott, Elements of Chemical Reaction Engineering (Fourth edition), 2006
Fan Liang-Shi, Zhu Chao, Principles of gas-solid flows, 1998
Kunii, D., Levenspiel, O. Fluidization Engineering. Butterworth-Heinemann. 1991.
Davidson, J. F., Harrison, D. Fluidization. Academic Press. 1971.
Kwauk, M. Fast Fluidization. Advances in Chemical Engineering Vol. 20., Academic Press. 1994.
Grace, J. et al. Fluidized Beds. Multiphase Flow Handbook. Taylor & Francis. 2006.
Some materials are selected and cited from latest journal papers.

Course title

Environmental Chemistry and Advanced Diagnostic Technologies

Instructor(s)-in-charge:

Prof. TIAN Zhen-Yu (66.7%),
Assistant Prof. WENG Jun-Jie (33.3%)

Course type:

Lecture

Course Schedule:

Listed in the table below.

Course Assessment:

Homework: 10 assignments

Grading Policy:

Assignments 40%, Final 40%, Attendance 20%

Course Prerequisites:

Familiar with the basic knowledge of college chemistry and college mathematics.

Catalog Description:

This course offers an introduction to chemical principles and concepts and applies them to relevant environmental situations and issues. The topics include introduction to environmental science, technology, and chemistry, basic chemical concepts; the chemistry of the atmosphere and its pollution; toxicological chemistry of chemical substances; aquatic chemistry; geosphere and geochemistry; soil environmental chemistry; principles of industrial ecology; advanced diagnostic technologies. It is expected that after taking this course, students will be familiar with basic chemistry principles on environmental science, technology and chemistry.

Schedule of the course

section	content	hours	Date
1	Introduction of environmental science	4	Sep. 11
2	Advanced chemical concepts: energy, entropy and rates of reaction	4	Sep. 18
3	Toxicological chemistry of chemical substances	4	Sep. 25
4	Environmental chemical analysis	4	Oct. 9
5	Atmospheric chemistry I: energy transfer, particles	4	Oct. 16
6	Atmospheric chemistry II: pollutants, smog	4	Oct. 23
7	Air and gas analysis	4	Oct. 30
8	Diagnostic analysis of wastes and solids	4	Nov. 6
9	Chemical analysis of water and waste water	4	Nov. 13
10	Diagnostic analysis of different materials	4	Nov. 20
11	Aquatic chemistry	4	Nov. 27
12	Geosphere and geochemistry	4	Dec. 4
13	Soil Environmental chemistry	4	Dec. 11
14	Principles of industrial ecology	4	Dec. 18
15	Presentation and examination	4	Dec. 25
Total		**60**	

Contents of the course

Section 1: Environmental Science, technology and chemistry

1. What is Environmental Science
2. Some basic chemical concepts
3. Atmospheric chemistry

Section 2: Environmental chemical analysis

4. The anthrosphere, industrial ecosystems, and environmental chemistry
5. Fundamentals of aquatic chemistry
6. Oxidation and reduction
7. Phase interactions
8. Aquatic microbial biochemistry
9. Water pollution
10. Water treatment
11. The atmosphere and atmospheric chemistry
12. Particles in the atmosphere
13. Gaseous inorganic air pollutants
14. Organic air pollutants
15. Photochemical smog
16. The geosphere and geochemistry
17. Soil Environmental chemistry

Section 3: Diagnostic technologies

18. Introduction of the diagnostic technologies
19. Classical methods
20. Spectrophotometric methods
21. Electrochemical methods of analysis
22. Chromatography
23. Mass spectrometry

Textbook and any related course material:

1) John Wright, Environmental Chemistry, Routledge, 2003.
2) Stanley E. Manahan, Environmental Chemistry, CRC Press LLC, 2000.
3) H.J.M. Bowen, Environmental Chemistry Volume 2, Royal Society of Chemistry, 2010.

Expected level of proficiency from students entering the course:

Mathematics: college mathematics
Chemistry: college chemistry

Course title

Mental Health promotion – Perspectives of Chinese culture

Instructor(s)-in-charge:

Professors HAN Buxin, LUO Fei, WEI Gaoxia

Course type:

Lecture

Teaching Assistant:

Ms. Xinrui WANG

Catalog Description:

Mental Health Promotion 2018 is designed as an introduction course of Chinese Culture and Psychology for oversea postgraduates in UCAS. The class will give students a general view of Chinese culture and some detailed psychological interpretation in some selected practices in daily life. As a course for research students a mini-seminar series are incorporated into the course to provide examples of studies carried out in frontiers of psychology.

Mental health is key issues for the healthy development and societal adaptation of either an individual or a group of people (ethnicity, nation, etc.). There are so many tries in developing concepts, theories, techniques, and practices in daily routine cross history which become available nowadays for almost every Chinese. However, those approaches may not be familiar to many young Chinese nowadays, never mention to foreigners. It will be a great opportunity for us to introduce these approaches to foreign students.

Lectures will begin with a briefing on Chinese culture in relation to integration of human and nature, festivals and rituals, the language and arts (e.g., character, scripts, words, seal cutting, couplets, calligraphy, poetry, painting, etc.), health and diseases in with respect to Traditional Chinese Medicine, healthy development of individual in family and society in ancient and modern China.

Three mainstream Chinese teachings will also be introduced to the students. These including teachings from Confucius, Lao Zi, and Buddha. While Confucianism built a path of health promotion in daily social and career livings, Taoism established a similar path via physiological and psychological training. Alternatively, the path of Buddhism is one from almost pure psychological perspective. All these teaching converged in the 10th to 14th CE and developed a culture of Zen in China, which becomes the basis of culture and life for people in East and Southeast Asia ever since. It also involves some exercise practices of mental health promotion, such as Tai Chi Chuan, Qigong and other mind-body practices, which will be demonstrated by combining Chinese-originated culture and martial arts spirits. Moreover, this lectures also give a general view of exercise outcomes from neuroscience perspective.

The course is structured as a series of lectures and mini-seminars in which individual research cases are discussed with faculty tutors. It will cover topics listed follow.

Schedule of the course

Section	Content	Hours	Date
1	Chinese culture in a brief: Psychological perspectives – Human, nature, gods, harmony and health, festival and rituals, religions, classics	4	9.12
2	Language, arts, and psychology (1): Script, Calligraphy, Seal	4	9.19
3	Language, arts, and psychology (2): Character, words, couplets, poetry	4	9.26
4	Chinese painting: An embedded cognition of human and nature	4	10.10
5	Health, disorder, and Traditional Chinese Medicine	4	10.17
6	Healthy development: Individual in family and society	4	10.24
7	The way of university: teaching from Confucius	4	10.31
8	How to work with both the body and the soul: Taoism psychophysiology and psychophysics	4	11.7
9	Elimination of the sufferings: how Buddhism works in South and East Asia	4	11.14
10	Passing on the torch: the culture of the Central State	4	11.21
11	Healthy development: Individual in family and society	4	11.28
12	Mental health promotion: perspective from exercise behavior	4	12.5
13	Neuroscience frontiers in exercise psychology	4	12.12
14	Final examination: Presentations on Chinese culture (1)	4	12.19
15	Final examination: Presentations on Chinese culture (2)	4	12.26
Total		60	

授课提纲 Outline

第 1 讲：中国文化（课程）概述 Lecture 1. Introduction of the Chinese culture

第 1 课：欢迎！祝贺！课程框架设计，讲员、助教介绍，考核方法 Welcome，Congratulations！Brief introduction of the lecturers

第 2 课：中国及中国人概况；中国之科学 -大跃进 Brief introduction of Chinese culture in related with (psychological) science

第 3 课：中国文化概览：历史、地理、人口、宗教；Chinese Culture at a glance – History, geography, demography, and religion

第 4 课：中国人、中国心 – 人格、颜色、公正观、小麦与大米 Chinese mind and mentality – Personality, belief in a just world

第 2 讲 汉语艺术与心理学（1）Lecture 2. Arts of Chinese and Psychology (1)

第 1 课：语言与艺术-英文书法、阿拉伯文书法、中国造字术（六书）、汉字的奥秘（故事） Chinese and art
第 2 课：汉字的形音义，笔划/部件/部首/偏旁、音素与形素、音调与平仄、汉字信息化 Features of Chinese character – Stroke and components
第 3 课：汉语-造词法、字频与词频及其心理效应、双拼输入法、中国人姓名及其心理效应 Psychological effect of Chinese character and name
第 4 课：标点符号（与英语的异同）、对联及其用法、春联三换 Punctuation, couplets, and Spring Festival

第 3 讲 汉语艺术与心理学（2）Lecture 3. Arts of Chinese and Psychology (2)
第 1 课：中国印-篆书、方寸之间、功能、朱文与白文、风格与流派、材质、边款 Chinese seal – Seal script and seal cutting
第 2 课：中国书法：中国字的艺术表现形式（篆隶正行楷草）、文房四宝、工具性艺术特征-从笔划（起笔运笔收笔）到结构（平衡）Calligraphy
第 3 课：书法作品种类及代表作品赏析-对联、中堂、斗方、条幅、横幅 Examples of calligraphy art work
第 4 课：中国诗词 - 种类、简史、格律、美文欣赏-古典小说与诗词推荐 Chinese poetry – The beauty of language

第 4 讲 中国画与心理学 Lecture 4. Psychology in Chinese painting
第 1 课：天人合一理论、道法自然-风水与气、构图理论（知白当黑、留气）、种类（写意、工笔/界画；人物、花鸟、山水）Philosophy in Chinese culture
第 2 课：落款、用印、历代经典名画欣赏（范宽-溪山行旅图、朱耷-笑之与哭之、张大千-青绿山水与泼墨荷花、齐白石-虾与蟹）Chinese painting
第 3 课：长寿的中国书画家、名家故事 Famous Chinese calligraphers and painters – Art of longevity
第 4 课：居家、办公室装点书画建议：言为心声、诗言志 Enjoy Chinese art work in home and office – Integrity in life

第 5 讲 健康、疾病与中医药学 Lecture 5. Health, disease and Traditional Chinese Medicine (TCM)
第 1 课：自然观：阴阳五行；人观与神观：经络穴位、五脏六腑、气；中药学：四气五味；中医药学现代化-成功与失败 YinYang and WuXing
第 2 课：健康观：阴平阳秘，精神乃治；养生观：修行与修身；疾病观：阴阳失衡 Integral concept of health – Cultivation and adjustment
第 3 课：养生与治疗观：吐纳、导引、内外兼修（太极拳）；药物，针灸按摩推拿（得气），刮痧 Diagnosis and therapy – theory and practice
第 4 课：中医学与心理学 – 归根心理学、失眠的中医治疗（冥想、针灸、药物、心理）Psychology in TCM

第 6 讲 健康发展：个人、家庭与社会 Lecture 6. Healthy development: Individual, family and society
第 1 课：家庭与家庭结构、社会层级、七大姑八大姨九族、姑舅老表 Familial and societal hierarchy

第 2 课：闪光灯记忆-节日与庆典-婚葬嫁娶；童年幸福记忆-妈妈做的好吃的；仪式感 Happy memory in rituals and festivals
第 3 课：毕生发展心理学-孔夫子与 Erikson，儒家关系主义（黄光国）Life span development – Confucianism in relationship
第 4 课：东西方人心理学研究-集体主义/个人主义，互依与独立，本土化与本地化 Psychology in comparison – Localization and globalization

第 7 讲 大学之道：孔子与儒家 Lecture 7. The Way of Universität: Confucius' teaching
第 1 课：中国文化的含义与特征 What is Chinese Culture?
第 2 课：《大学》的主题：大人之学 Introduction on How to Be Big
第 3 课：明德、亲民、至善，大学的实施途径 Practical path to achieve Big Man
第 4 课：从格物致知开始 Start with studying phenomena

第 8 讲 身心调节：道家的心理生理学 Lecture 8. Taoism and Psychophysiology
第 1 课：治大国若烹小鲜 Managing and cooking
第 2 课：神秘主义与内心矛盾 The origin of mythology
第 3 课：观察能力的训练 Training observation
第 4 课：道家心理生理学 Taoism psychophysiology

第 9 讲 痛苦的消除与佛教 Lecture 9. The Ending of Suffers
第 1 课：心理拉伸训练 A Psychological Stretch
第 2 课：脑科学与认识世界 Brain Science and Cognition
第 3 课：佛陀的基本教育 Buddha's Teaching
第 4 课：内心的分层探索 Deeper Exploration of the Mind

第 10 讲 中国禅文化的传承 Lecture 10. Zen in China
第 1 课：禅的传承与演变 Heredity and Evolution of Zen
第 2 课：佛教的宇宙观与生命观 Introduction of Buddhist Cosmology
第 3 课：中国化的禅宗公案 Stories of Chinese Zen
第 4 课：禅的心理启示及其现代化 Zen culture: psychological insight and modernization

第 11 讲 中国传统武术与心理学 Lecture 11. Chinese Martial Arts and Psychology
第 1 课 中国功夫释义与概说 Overview of Chinese Kung-fu
第 2 课 文化使命：止戈为武 Function and role of Kung-fu
第 3 课 传统武术中的身心调节运动 Mind-body exercise
第 4 课 腹式呼吸 Abdominal breathing

第 12 讲 太极拳 Lecture 12. Tai Chi Chuan
第 1 课 太极拳历史与流派 History and styles of Tai Chi Chuan
第 2 课 养生拳法 Tai Chi Chuan Movement
第 3 课 太极拳与心理健康促进 Tai Chi Chuan and mental health
第 4 课 太极拳作为替代医学的科学证据 Scientific evidences of Tai Chi Chuan as treatment

Course title

Geographic Information Systems

Instructor(s)-in-charge:

Prof. SONG Xianfeng, Dr. SONG Ci and Dr. YI Jiawei

Course type:

Lecture

Course Schedule:

4hrs/week by instructor

Course Assessment:

Homework: 3 assignments

Grading Policy:

Typically 50% homework, 50% final.

Course Prerequisites:

Introductory courses related to geography, environmental sciences, and cartography.

Catalog Description:

This course includes two parts - lectures and laboratory practice. The lectures introduce the methods of managing and processing geospatial data, and cover the topics of coordinate systems, spatial data models and structures, spatial analysis, and GIS models and modeling. The laboratory practice is designed to help students to master a GIS software (i.e. ArcGIS desktop or QGIS) by a number of experiences on data management, data analysis, GIS modeling, and result presentation.

Schedule of the course

chapter	content	hours	Date
1-2	Nature of Geographic data Coordinate Systems	4	October 10
3-4	Geo-data Organization (vector, raster, tin, …)	4	October 17
5-6	Spatial Data Acquisition Geometric Transformation	4	October 24
7-9	Attribute Data Management Cartography and GIS Mapping	4	October 31
	Homework 1		
10	Data Exploration	4	November 7
11	Vector Data Analysis	4	November 14
12	Raster Data Analysis	4	November 21
13-14	Terrain, Viewshed and Watershed Analysis	4	November 28
	Homework 2		
15	Spatial Interpolation	4	December 5
16	Least Cost Path and Network Analysis	4	December 12
17	GIS Models and Modeling	4	December 19
	Homework 3		
18	Exam	4	December 26
Total		48	

Contents of the course

Section 1: Conceptual Frameworks for GIS

1 Nature of Geographic data
2 Coordinate Systems
3 Vector Data Model
4 Raster Data Model

Section 2: Spatial Data Management

5 GIS Data Acquisition
6 Geometric Transformation
7 Spatial Data Accuracy and Quality
8 Attribute Data Management
9 Data Display and Cartography

Section 3: Spatial Analysis

10 Data Exploration
11 Vector Data Analysis
12 Raster Data Analysis
13 Terrain Mapping and Analysis
14 Viewshed and Watershed Analysis
15 Spatial Interpolation
16 Least Cost Path and Network Analysis

Section 4: GIS Modeling

17 GIS Models and Modeling

Textbook and any related course material:

Introduction to Geographic Information Systems, 8th Edition, 2016
Edited by Kang-tsung Chang.
Geospatial Analysis: a comprehensive guide to principles, techniques and software tools, 6th Edition, 2018
http://www.spatialanalysisonline.com/HTML/index.html
Edited by Michael J de Smith, Michael F Goodchild, Paul A longley
Geospatial Analysis: a comprehensive guide to principles, techniques and software tools), 3rd Edition, 2007
Edited by Michael J de Smith, Michael F Goodchild, Paul A longley

Expected level of proficiency from students entering the course:

Geosciences: strong
Computer Sciences: middle

Course title

Application of MATLAB on Scientific Computing

Instructor(s)-in-charge:

Dr. Zhang Xiaogaung

Course type:

Lecture

Course Schedule:

4hrs/week by instructor

Course Assessment:

Homework: 10 assignments

Grading Policy:

Typically 10%Attendance, 50%homework, 40%final.

Course Prerequisites:

Calculus, Linear Algebra, Probability and Statistics

Catalog Description:

The course of Application of MATLAB on Scientific Computing includes eleven sections. In order to provide the students with essential overall picture of the course, the first section will involve brief introductions to the course. The introductions will clarify the relevant arrangements to the course, including the course schedule and grading requirements. Additionally the purpose of the course will be provided in the introduction section. Overviews of the two main topics of the course, MATLAB and scientific computing will also be included in the introduction section.

Since the skill of executing basic calculations and programing using MATLAB is essential for performing scientific computing with MATLAB, Section 2, Section3, and Section 4 will focus on providing relevant trainings to students, in order for enabling students to achieve required skills. The relevant trainings include operating basic data types and operators, graphically display data, and implementing programs.

With the skill of executing basic calculations and programing using MATLAB, students could implement a mathematical model with MATLAB. However, the wide range of scientific computing and the corresponding varieties of supports provided by MATLAB would also become an obstacle for students to accomplish implementing a mathematical model. Therefore the rest of the sections of the course will cover the methods of implementing some essential and commonly used basic mathematical models with MATLAB. The covered mathematical models include Data Interpolation, Linear Equations, Derivatives, Integrals, Ordinary Differential Equations, Basic Probabilities, Descriptive Data Analysis, Variance Analysis, and Linear Regression.

Schedule of the course

Section	Content	hours	Date
1	Introduction to MATLAB and Scientific Computing	4	September 11
2	Basic Data Types and Operators	4	September 18
3	Graphical Displays of Data	4	September 25

4	Programing with MATLAB	4	October 9
5	Data Interpolation	2	October 16
6	Linear Equations	2	October 16
7	Derivatives, Integrals and Ordinary Differential Equations	4	October 23
8	Basic Probabilities	4	October 30
9	Descriptive Data Analysis	4	November 6
10	Variance Analysis	4	November 13
11	Linear Regression	4	November 20
Total		40	

Contents of the course

Section 1: Introduction to MATLAB and Scientific Computing

4. Introduction to the course
(1) Schedule of the course
(2) Grading policy and assignment requirements
(3) Purpose and scope of the course
5. Introduction to scientific computing
(1) Mathematical models
(2) Methodologies of scientific computing
6. Introduction to MATLAB
(1) Why MATLAB
(2) GUI of MATLAB
(3) Helps of MATLAB
(4) Introduction to MATLAB

Section 2: Basic Data Types and Operators

7. Basic data types
8. Operators on arrays
9. Operators on Matrices
10. Operator of singular vector decomposition
11. Operators on symbols
12. Operators on complex numbers
13. Operators on polynomials

Section 3: Graphical Displays of Data

14. Procedure for graphically display data
15. 2-D data display
16. 3-D data display
17. Animated data display

Section 4: Programing with MATLAB

18. Principles of programing
19. M Files
20. Structure of programs
21. Functions
22. Control Flows

23. Debugging

Section 5: Data Interpolation

24. 1-D data interpolation
25. 2-D data interpolation

Section 6: Linear Equations

26. Gaussian elimination
27. Sparse matrices
28. Condition number

Section 7: Derivatives, Integrals and Ordinary Differential Equations

29. Symbolic integration
30. Symbolic derivatives
31. Numerical integration
32. Numerical differentiation
33. Symbolic solution of differential equation
34. Numerical solution of differential equation

Section 8: Basic Probabilities

35. Distributions of random variables
36. Expectations
37. Variance and covariance

Section 9: Descriptive Data Analysis

38. Basic statistical measurement
39. Data distribution
40. Correlation analysis

Section 10: Variance Analysis

41. One-way analysis of variance
42. Two-way analysis of variance
43. N-way analysis of variance

Section 11: Linear Regression

44. Least Squares
45. Univariate regression
46. Multiple regression
47. Basis functions and dictionary method
48. Principle components regression

Textbook and any related course material:

MATLAB help, https://www.mathworks.com/help/
Numerical Computing with MATLAB, by Cleve Moler, Mathworks
Linear Models and Generalizations-Least Squares and Alternatives, by Rao, C.R., Toutenburg, H., Shalabh, Heumann, C., Springer
A Course in Probability and Statistics, by Charles J. Stone, Duxbury Press
Introduction to Linear Algebra, by Lee W. Johnson, R. Dean Riess, Jimmy T. Arnold, Pearson

Expected level of proficiency from students entering the course:

Mathematics: moderate

Course title

Scientific Writing

Objectives

For graduate students, writing academic papers in English not only means a fundamental skill in their academic study, but also symbolizes their professional development and achievement. Grounded on the common difficulties and challenges that science students may encounter in their academic writing, the aim of this course is to help them understand academic papers' style, guidelines, and writing methods, improve their language accuracy in academic contexts, and therefore, improve their confidence and capacity in academic English writing.

Main Contents

This course is designed as a series of 4-hour lectures, 11 lectures in total for the present course syllabus. The topics of these lectures range from stylistic features of academic papers to abstract writing, to approaches of integrating outside sources, to visual information, to cohesive devices, and to how to make academic presentation.

Teaching Approaches

Class instruction

Textbooks and Reference Books

1. Grace Canseco. Inside Academic Writing: Understanding Audience and Becoming Part of an Academic Community, Ann Arbor University of Michigan Press, 2010.
2. Robert A. Day and Barbara Gastel. How to Write and Publish a Scientific Paper (Sixth Edition), Peking University Press, 2012.
3. John M. Swales and Christine B. Feak. Academic Writing for Graduate Students: Essential Tasks and Skills (3rd Edition), University of Michigan Press, 2012.

Course title

Travel Album China

Instructor(s)-in-charge:

Dr. CHU GUOFEI

Course type:

Lecture

Course Schedule:

3hrs/week by instructor

Course Assessment:

Homework: 3 assignments

Grading Policy:

Typically 60% homework, 20% midterm, 20% final

Course Prerequisites:

Curiosity, interest in China

Catalog Description:

This course includes three sections: the Mosaic, Chinese geography and presentation. The Mosaic focuses on some basic knowledge such as sight words, Chinese poems, Chinese proverbs, the 24 solar terms, etc. Chinese geography covers twelve typical cities and areas around China, to name a few, Beijing, Shanghai, Xi'an, Su-Hang, the Five Mountains, Yang-tze River. By introducing cities and areas, the students will have a general understanding about Chinese cities and culture. Hopefully, they will be more interested in Chinese culture and find it easier to travel around, with a basic knowledge of Chinese geography. Section 3 will be presentation time. Each Student will be asked to make a five-minute presentation, introducing his/her hometown.

Schedule of the course

	content	**hours**	**Date**
1	Introduction The basics Beijing	3	Sept. 14
2	The basics Jiangnan and Shanghai	3	Sept. 21
3	The basics Lingnan, Shenzheng and Guilin presentation	3	Sept. 28
4	The basics The Northeast, Changbaishan Mountain and Harbin Presentation	3	Oct. 12
5	The basics Sichuan and Chengdu Presentation	3	Oct. 19
6	The basics Dongting Lake and the Five Mountains Presentation	3	Oct. 26

7	The basics The Yang-tze River and the Yellow River Presentation	3	Nov. 2
8	The basics The Central Plains and Shanhai Pass Presentation	3	Nov. 9
9	The Basics Loess Plateau and Xi'an Presentation	3	Nov. 16
10	The basics The Qilian Mountains, Dunhuang and Yumen Pass Presentation	3	Nov. 23
11	The basics Chengde, Xiahe, the Flame Mountain and the Journey to the West Presentation	3	Nov. 30
12	The basics The Yunnan Guizhou Plateau and Hainan Presentation	3	Dec. 7
13	The basics Mount Jolmo Lungma and the Yalutsangpo River Presentation	3	Dec. 14
14	The basics Summary	3	Dec. 21
Total		42	

Contents of the course

Section 1: the Mosaic

1. sight words
2. Chinese poems
3. Chinese proverbs
4. the 24 solar terms
5. Fair tales and methology

Section 2: Chinese geography

1. Introduction, Beijing
2. Jiangnan, Shanghai and Su-Hang
3. Lingnan, Shenzheng and Guilin
4. the Northeast, Changbaishan Mountain and Haerbin
5. Sichuan and Chengdu
6. Dongting Lake, the Five Mountains
7. the Yang-tze River and the Yellow River
8. the Central Plains and Shanhai Pass
9. Loess Plateau and Xi'an
10. the Qilian Mountains, Dunhuang and Yumen Pass
11. Chengde, Xiahe, the Flame Mountain and the Journey to the West

12. the Yunnan Guizhou Plateau and Hainan
13. Mount Jolmo Lungma and the Yalutsangpo River
14. summary

Section 3: Presentation

From the third course, there will be a 20 minutes' window for 3-4 presentations. Students will be asked to make a 5-minute presentation, introducing their hometown.

Textbook and any related course material:

Chinese National Geography *(*dili306.com*)*.

Shuimohanzi, by Bao Dongni, illustrated by Zhu Ying, Beijing Normal University Publishing Group.

Zhejiushi Ershisi Jieqi, by Gao Chunxiang, Shao Min, illustrated by Xu Mingzhen, Li Jing, Dolphin Books.

Gei Haizide Gushici, edited by Ye Jiaying, China CITIC Press.