# COURSE CATALOG

# 2017-2018 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 7 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 you own institutes first.

## 2. General Degree Requirements for Masters

The requirement of UCAS for Masters is to get at least 30 credits before graduation. 19 credits should be from Degree Courses. Within the 19 credits, at least 12 credits should be from Professional Degree Courses.

## 3. Courses Type

Courses in International College are classified as three types: Public compulsory courses; Professional courses; Optional courses.

### 3.1 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 three conditions can apply for the course waiver and will get 6 credits directly.
A. Providing a certificate of HSK Level 3;
B. Passing a Chinese test which will be the same level of HSK 3. The test will be arranged by International College during September.
C. 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. Sophie (**hutian@ucas.ac.cn)** before the end of September.

### 3.2 Professional courses—Degree Courses and Non-degree Courses

Professional courses this year in Yanqihu campus cover three academic areas: Life Science; Chemistry; Geoscience. Each Professional course is usually once a week and each time lasts 4 class hours. Most Professional courses have 4 credits. 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. A PhD student who fails one Degree Course has one chance to retake this course and if fails again s/he will drop out of the PhD program. A PhD student **CANNOT** fail two Degree Courses, otherwise s/he will drop out of the PhD

program. A Master student **CANNOT** fail two Degree Courses, otherwise s/he will drop out of the Master program. 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.

### 3.3 Optional courses—Non-degree Courses

This semester we have two optional courses, both of them should be Non-degree courses.

Scientific Writing (2 credits);
Research Ethics (2 credits).

## 4. Course Selection Process

| **Date** | **Process** |
|---|---|
| Sep.11 | Chinese Courses start |
| Sep. 11 | Professional Courses start |
| Sep.12-Sep.29 | Determine which professional courses you will take and select the professional courses in the Course Selection System. |
| Sep. 30-Oct. 8 | National Day Vocation lasts 9 days. |
| Dec.29 | Chinese Courses end |
| Dec.29 | Professional Courses end |
| Next Semester | The transcripts in Chinese and English will be sent to the institutes |

## 5. 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 you 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 two weeks courses starting, the system will be closed. Then everyone will receive the message for signing in the International College Office 221 to determine the professional courses.

**Website: http://ic-course.ucas.ac.cn/**
**Username: Your student ID number**
**Original password: 123456**

Please use the Google Chrome to log in.
The capacity of every course is limited and first come first select.
Please select the right courses which are in Yanqihu campus. **Do not** select courses in Zhongguancun campus. The mention of campus is shown in **Classroom**.

## 6. Contact Information

- Phone: 010-82680563, Ms. Sophie
- E-mail: hutian@ucas.ac.cn
- Address: Room 221, Building 6 in Zhongguancun Campus.

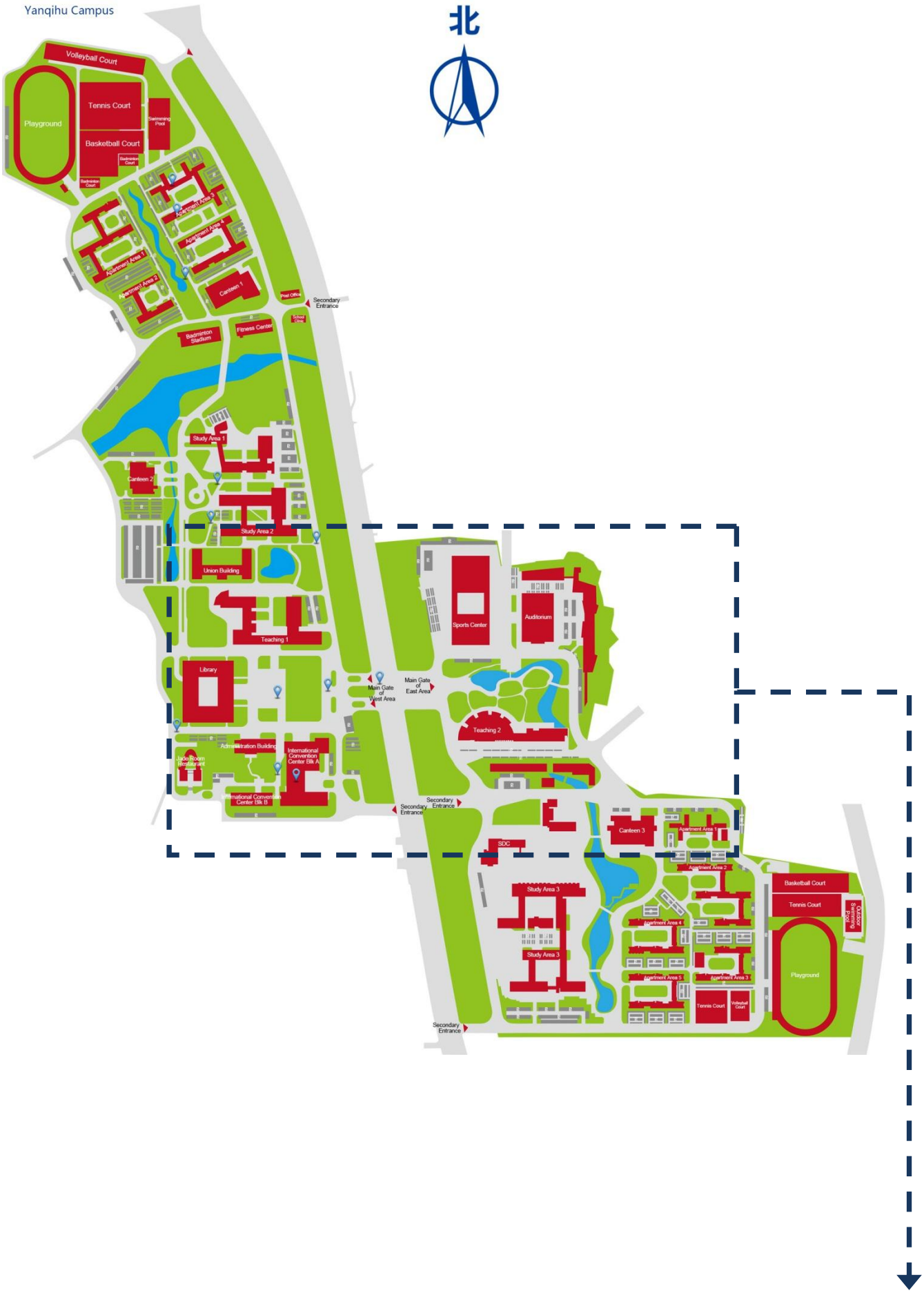
## 7. Courses List

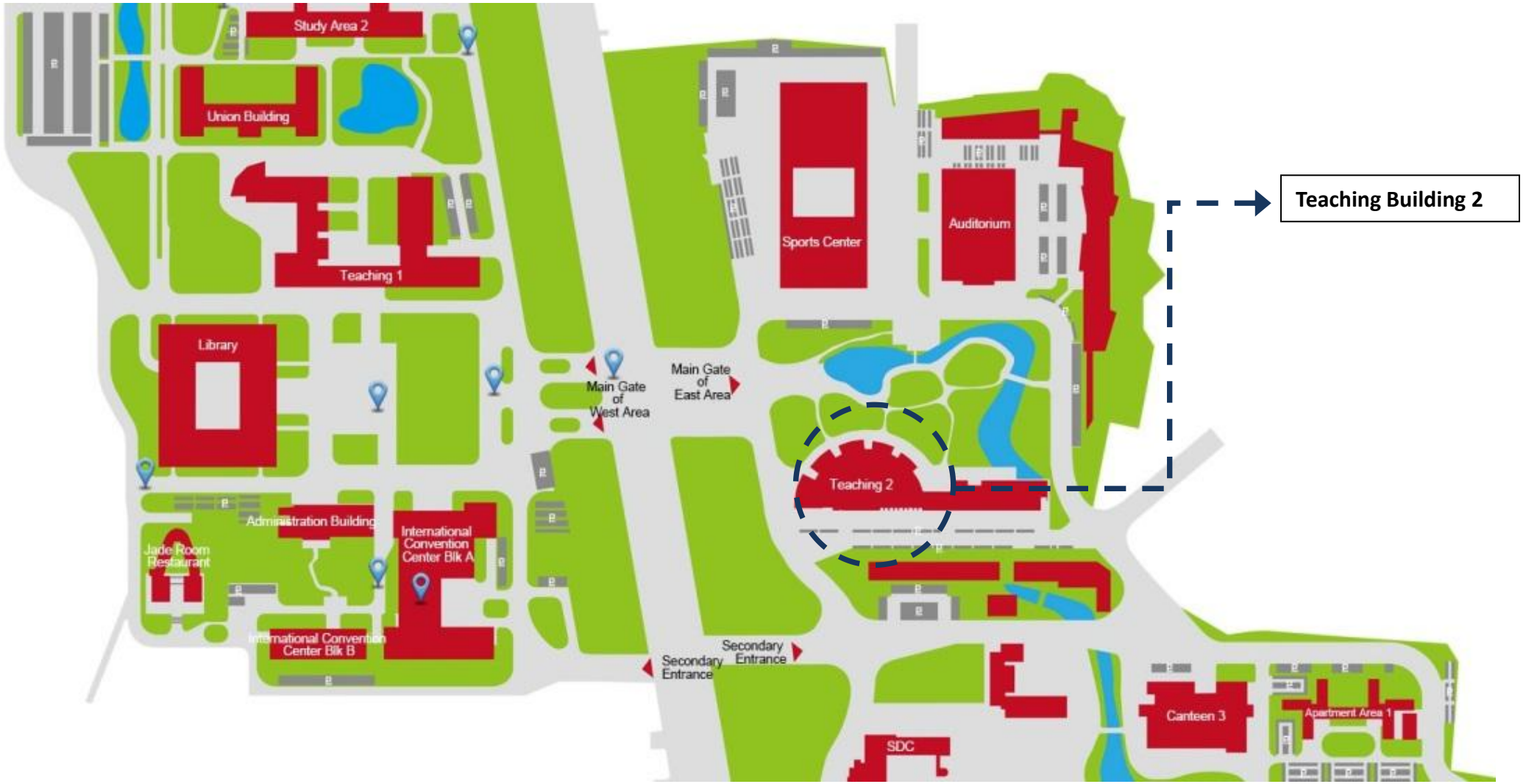
| Code | Name | Type | Capacity | Hours/ Credits | Time | Classroom | Professors | Date/Times |
|---|---|---|---|---|---|---|---|---|
| 171M1035H | Molecular Biology and Genomics | Professional courses | 100 | 60/4.0 | Wed. (13:30-17:00) | Teaching2-204 | SUN Yingli | SEP.13-NOV.1, 7 times |
| | | | | | | | JING Haichun | NOV.8-DEC.27, 8 times |
| 171M1036H | Immunology and Biophysics | Professional courses | 100 | 60/4.0 | Mon. (13:30-17:00) | Teaching2-327 | LIU Pingsheng | SEP.11-OCT.30, 7 times |
| | | | | | | | FANG Min | NOV.6-DEC.25, 8 times |
| 171M1037H | Developmental Biology | Professional courses | 58 | 60/4.0 | Tues. (13:30-17:00) | Teaching2-418 | YUAN Li | SEP.12-Oct.31, 7 times |
| | | | | | | | CHENG Youfa | NOV.7-DEC.26, 8 times |
| 172M1038H | Climate Change, Environmental and Natural Resources Management | Professional courses | 100 | 60/4.0 | Mon. (13:30-17:00) | Teaching2-227 | KANG Shichang | SEP.11-OCT.30, 7 times |
| | | | | | | | DENG Xiangzheng | NOV.6-DEC.25, 8 times |
| 172M1039H | Earth System Science | Professional courses | 58 | 60/4.0 | Tues. (13:30-17:00) | Teaching2-423 | CHEN Fang | SEP.12-OCT.31, 7 times |
| | | | | | | | WANG Shimin | NOV.7-DEC.26, 8 times |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 173M1040H | Functional Nanostructures: Syntheses, Characterization and Device Application | Professional courses | 58 | 60/4.0 | Thur.(13:30-17:00) | Teaching2-418 | HE Jun | SEP.14-DEC.28, 15 times |
| 173M1041H | Introduction of Metallurgical Engineering and Environmental Sciences | Professional courses | 58 | 60/4.0 | Fri. (13:30-17:00) | Teaching2-419 | DU Hao | SEP.15-NOV.3, 7 times |
| | | | | | | | LIU Xiaoxing & LU Bona | NOV.10-DEC.29,8 times |
| 173M1042H | Organometallic Chemistry | Professional courses | 46 | 60/4.0 | Wed. (13:30-17:00) | Teaching2-338 | SUN Wenhua | SEP.13-DEC.27, 15 times |
| 17MGX028H-2 | Research Ethics | Optional courses | 46 | 21/2.0 | Mon. (14:20-17:10) | Teaching2-238 | ZENG Changqing | SEP.18-DEC.25, 7 times |
| 17MGX014H-2 | Scientific Writing | Optional courses | 58 | 48/2.0 | Thur. (13:30-16:10) | Teaching2-318 | YU Hua et al. | SEP.14-DEC.28, 15 times |
| 17MGX014H-3 | Scientific Writing | Optional courses | 46 | 48/2.0 | Wed. (13:30-16:10) | Teaching2-436 | PENG Gong | SEP.13-DEC.27, 15 times |

| Class No. | Code | Name | Type | Hours/Credits | Time | Classroom | Teachers |
|---|---|---|---|---|---|---|---|
| Y-1 | 17MGB 015H-01 | Elementary Chinese-Reading and Writing | Public compulsory courses | 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 | |
| Y-2 | 17MGB 015H-02 | Elementary Chinese-Reading and Writing | Public compulsory courses | 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 | |
| Y-3 | 17MGB 015H-03 | Elementary Chinese-Reading and Writing | Public compulsory courses | 128/2.0 | Mon.( 8:30-10:10) | Teaching2-321 | HE Tao |
| | | | | | Wed.( 10:20-12:00) | Teaching2-321 | |
| | | | | | Thur.( 8:30-10:10) | Teaching2-418 | |
| | | | | | Fri.(10:20-12:00) | Teaching2-321 | |
| Y-4 | 17MGB 015H-04 | Elementary Chinese-Reading and Writing | Public compulsory courses | 128/2.0 | Mon.(10:20-12:00) | Teaching2-418 | HE Tao |
| | | | | | Wed.(8:30-10:10) | Teaching2-418 | |
| | | | | | Thur.(10:20-12:00) | Teaching2-419 | |
| | | | | | Fri.(8:30-10:10) | Teaching2-418 | |
| Y-1 | 17MGB 016H-01 | Elementary Chinese-Listening and Speaking | Public compulsory courses | 128/2.0 | Mon.(10:20-12:00) | Teaching2-238 | HE Fei |
| | | | | | Wed.(8:30-10:10) | Teaching2-238 | |
| | | | | | Thur.(10:20-12:00) | Teaching2-238 | |
| | | | | | Fri.(8:30-10:10) | Teaching2-238 | |
| Y-2 | 17MGB 016H-02 | Elementary Chinese-Listening and | Public compulsory | 128/2.0 | Mon.( 8:30-10:10) | Teaching2-318 | HE Fei |
| | | | | | Wed.( 10:20-12:00) | Teaching2-318 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Speaking | courses | | Thur.( 8:30-10:10) | Teaching2-323 | |
| | | | | | Fri.(10:20-12:00) | Teaching2-318 | |
| Y-3 | 17MGB 016H-03 | Elementary Chinese-Listening and Speaking | Public compulsory courses | 128/2.0 | Mon.(10:20-12:00) | Teaching2-321 | LIU Xiaomeng |
| | | | | | Wed.(8:30-10:10) | Teaching2-321 | |
| | | | | | Thur.(10:20-12:00) | Teaching2-418 | |
| | | | | | Fri.(8:30-10:10) | Teaching2-321 | |
| Y-4 | 17MGB 016H-04 | Elementary Chinese-Listening and Speaking | Public compulsory courses | 128/2.0 | Mon.( 8:30-10:10) | Teaching2-418 | LIU Xiaomeng |
| | | | | | Wed.( 10:20-12:00) | Teaching2-418 | |
| | | | | | Thur.( 8:30-10:10) | Teaching2-419 | |
| | | | | | Fri.(10:20-12:00) | Teaching2-418 | |
| Y-1 | 17MGB 017H-01 | China Panorama | Public compulsory courses | 48/2.0 | Tues.(9:20-12:00) | Teaching2-318 | CAO Zhihong |
| Y-2 | 17MGB 017H-02 | China Panorama | Public compulsory courses | 48/2.0 | Tues.(19:00-21:40) | Teaching2-318 | CAO Zhihong |
| Y-3 | 17MGB 017H-03 | China Panorama | Public compulsory courses | 48/2.0 | Mon.(19:00-21:40) | Teaching2-121 | YE Qing |
| Y-4 | 17MGB 017H-04 | China Panorama | Public compulsory courses | 48/2.0 | Mon.(19:00-21:40) | Teaching2-118 | CHEN Tianjia |


Yanqihu Campus
北
Volleyball Court
Playground
Tennis Court
Swimming Pool
Basketball Court
Badminton Court
Badminton Court
Apartment Area 5
Apartment Area 4
Apartment Area 1
Apartment Area 2
Canteen 1
Post Office
Secondary Entrance
School Office
Badminton Stadium
Fitness Center
Study Area 1
Canteen 2
Study Area 2
Union Building
Teaching 1
Library
Main Gate of West Area
Main Gate of East Area
Sports Center
Auditorium
Teaching 2
Administration Building
International Convention Center Blk A
Jade Room Restaurant
International Convention Center Blk B
Secondary Entrance
Secondary Entrance
Canteen 3
Apartment Area 1
Apartment Area 2
SDC
Study Area 3
Study Area 3
Apartment Area 4
Apartment Area 5
Apartment Area 3
Tennis Court
Volleyball Court
Secondary Entrance
Basketball Court
Tennis Court
Outdoor Swimming Pool
Playground


Study Area 2
Union Building
Teaching 1
Library
Administration Building
Jade Room Restaurant
International Convention Center Blk A
International Convention Center Blk B
Main Gate of West Area
Main Gate of East Area
Sports Center
Auditorium
Teaching 2
Teaching Building 2
Secondary Entrance
Secondary Entrance
SDC
Canteen 3
Apartment Area 1

# 2017－2018 学年秋季学期(Autumn Semester)校历

| 年度 year | 2017 | | | | | | | | | | | | | | | | | 2018 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 21 |
| 星期一（Mon） | 4 | 11 | 18 | 25 | 2 | 9 | 16 | 23 | 30 | 6 | 13 | 20 | 27 | 4 | 11 | 18 | 25 | 1元旦 | 8 | 15 | 22 |
| 星期二（Tue） | 5 | 12 | 19 | 26 | 3 | 10 | 17 | 24 | 31 | 7 | 14 | 21 | 28 | 5 | 12 | 19 | 26 | 2 | 9 | 16 | 23 |
| 星期三（Wed） | 6 | 13 | 20 | 27 | 4中秋节 | 11 | 18 | 25 | 1 | 8 | 15 | 22 | 29 | 6 | 13 | 20 | 27 | 3 | 10 | 17 | 24 |
| 星期四（Thu） | 7 | 14 | 21 | 28 | 5 | 12 | 19 | 26 | 2 | 9 | 16 | 23 | 30 | 7 | 14 | 21 | 28 | 4 | 11 | 18 | 25 |
| 星期五（Fri） | 8 | 15 | 22 | 29 | 6 | 13 | 20 | 27 | 3 | 10 | 17 | 24 | 1 | 8 | 15 | 22 | 29 | 5 | 12 | 19 | 26 |
| 星期六（Sat） | 9 | 16 | 23 | 30 | 7 | 14 | 21 | 28 | 4 | 11 | 18 | 25 | 2 | 9 | 16 | 23 | 30 | 6 | 13 | 20 | 27 |
| 星期日（Sun） | 10 | 17 | 24 | 1国庆节 | 8 | 15 | 22 | 29 | 5 | 12 | 19 | 26 | 3 | 10 | 17 | 24 | 31 | 7 | 14 | 21 | 28 |
| 说 明 | 1、Courses start from Sep. 11th. Courses end to Dec. 29th.<br>Vocations: National Day lasts from Sep. 30th - Oct. 8th. | | | | | | | | | | | | | | | | | | | | |

# Course Syllabus

**Course title**

## Molecular Biology and Genomics Part I

**Instructor(s)-in-charge:**

*Prof. SUN Yingli*

**Course type:**

*Lecture*

**Course Schedule:**

*See Schedule of the course*

**Course Assessment:**

*Homework: 2 assignments*

**Grading Policy:**

*Typically 40% homework, 60% final.*

**Course Prerequisites:**

*Without*

**Catalog Description:**

*This course includes some principle of Molecular Biology and Genomics. We will learn how DNA replication and RNA transcription, also know how RNA guide protein express. After that I will explain the regulation of gene expression. Later together we can talk about the DNA damage and DNA repair. For the life science make such rapid progress, at last we can study some research progress on Genomics.*

**Schedule of the course**

| section | content | hours | Date |
|---|---|---|---|
| 1 | An Introduction to Molecular Biology and Genomics | 4 | September 13 |
| 2 | DNA and DNA replication | 4 | September 20 |
| 3 | RNA and RNA transcription | 4 | September 27 |
| 4 | Protein and genetic codon | 4 | October 11 |
| 5 | Regulation of gene expression | 4 | October 18 |
| 6 | DNA damage and repair | 4 | October 25 |
| 7 | Research progress on Genomics | 4 | November 1 |
| total | | 28 | |

**Contents of the course**

**Section 1: About what is gene**

**Section 2: About gene expression regulation**

**Section 3: About research progress on genomics**

**Textbook and any related course material:**

*Molecular Biology*

*ISBN-13 : 9781423218739*

*Author :Brooks, Randy*

*Molecular Biology of the Gene, 6th ed.*
*Author : J.D. Watson, et al.,*
*Cold Spring Harbor Laboratory Press, 2008, 841 pp., hard cover*

*Molecular Biology of the Gene (7th Edition) 2013*
*Author : James D. Watson, Tania A. Baker, Stephen P. Bell*

*Lewin 's Genes XI*
*Publication Date: December 31, 2012*
*ISBN-10: 1449659853*
*ISBN-13: 978-1449659851*

*Genes Ⅷ*
*Author : Benjamin Lewin*

**Course title**

## Molecular Biology and Genomics Part II

**Instructor(s)-in-charge:**

*Prof. JING Haichun*

**Course type:**

*Lecture*

**Course Schedule:**

*See Schedule of the course*

**Course Assessment:**

*Homework: 2 assignments*

**Grading Policy:**

*Typically 40% homework, 60% final.*

**Course Prerequisites:**

*Without*

**Catalog Description:**

*This course will introduce some principle of plant breeding. We will explain the importance of crop domestication and germplasm conservation for plant breeding, also introduce that how to improve plant breeding, especially the science and art of crop improvement. At last we can study reverse genetic approaches and omics technology in plant breeding.*

**Schedule of the course**

| section | content | hours | Date |
|---|---|---|---|
| 1 | Agriculture, Crop Domestication and Germplasm Conservation I | 4 | Nov. 8 |
| 2 | Agriculture, Crop Domestication and Germplasm Conservation II | 4 | Nov. 15 |
| 3 | Plant Breeding-The Science and Art of Crop Improvement I | 4 | Nov. 22 |
| 4 | Plant Breeding-The Science and Art of Crop Improvement II | 4 | Nov. 29 |
| 5 | Reverse Genetic Approaches in Plant Breeding I | 4 | Dec. 6 |
| 6 | Reverse Genetic Approaches in Plant Breeding II | 4 | Dec. 13 |
| 7 | Omics Technology in Plant Breeding I | 4 | Dec. 20 |
| 8 | Omics Technology in Plant Breeding II | 4 | Dec. 27 |
| total | | 32 | |

**Contents of the course：**

**Section 1: About what is plant breeding**

**Section 2: How to improve plant breeding**

**Section 3: About some new methods for plant breeding**

## Textbook and any related course material:

### Lecture 1 and 2_reference list

Doebley J. The genetics of maize evolution[J]. Annu. Rev. Genet., 2004, 38: 37-59.

Hoisington D, Khairallah M, Reeves T, et al. Plant genetic resources: What can they contribute toward increased crop productivity?[J]. Proceedings of the National Academy of Sciences, 1999, 96(11): 5937-5943.

Tester M, Langridge P. Breeding technologies to increase crop production in a changing world[J]. Science, 2010, 327(5967): 818-822.

Wu X. Prospects of developing hybrid rice with super high yield[J]. Agronomy Journal, 2009, 101(3): 688-695.

Feuillet C, Langridge P, Waugh R. Cereal breeding takes a walk on the wild side[J]. Trends in Genetics, 2008, 24(1): 24-32.

Servin B, Martin O C, Mézard M. Toward a theory of marker-assisted gene pyramiding[J]. Genetics, 2004, 168(1): 513-523.

Li C, Zhou A, Sang T. Rice domestication by reducing shattering[J]. science, 2006, 311(5769): 1936-1939.

McCouch S R, McNally K L, Wang W, et al. Genomics of gene banks: A case study in rice[J]. American journal of botany, 2012, 99(2): 407-423.

Gepts P. Who owns biodiversity, and how should the owners be compensated?[J]. Plant physiology, 2004, 134(4): 1295-1307.

Sachs M M. Cereal germplasm resources[J]. Plant physiology, 2009, 149(1): 148-151.

Gross B L, Olsen K M. Genetic perspectives on crop domestication[J]. Trends in plant science, 2010, 15(9): 529-537.

Doebley J F, Gaut B S, Smith B D. The molecular genetics of crop domestication[J]. Cell, 2006, 127(7): 1309-1321.

Purugganan M D, Fuller D Q. The nature of selection during plant domestication[J]. Nature, 2009, 457(7231): 843-848.

Tanno K, Willcox G. How fast was wild wheat domesticated?[J]. Science, 2006, 311(5769): 1886-1886.

Fuller D Q. Contrasting patterns in crop domestication and domestication rates: recent archaeobotanical insights from the Old World[J]. Annals of Botany, 2007, 100(5): 903-924.

Dempewolf H, Hodgins K A, Rummell S E, et al. Reproductive isolation during domestication[J]. The Plant Cell Online, 2012, 24(7): 2710-2717.

Vaughan D A, Balazs E, Heslop-Harrison J S. From crop domestication to super-domestication[J]. Annals of Botany, 2007, 100(5): 893-901.

Gross B L, Olsen K M. Genetic perspectives on crop domestication[J]. Trends in plant science, 2010, 15(9): 529-537.

Tanksley S D, McCouch S R. Seed banks and molecular maps: unlocking genetic potential from the wild[J]. Science, 1997, 277(5329): 1063-1066.

Kilian B, Graner A. NGS technologies for analyzing germplasm diversity in genebanks[J]. Briefings in functional genomics, 2012: elr046.

Preston J C, Wang H, Kursel L, et al. The role of teosinte glume architecture (tga1) in coordinated regulation and evolution of grass glumes and inflorescence axes[J]. New Phytologist, 2012, 193(1): 204-215.

**Lecture 3 and 4_reference list**

Frankham R. Genetics and extinction[J]. Biological conservation, 2005, 126(2): 131-140.

Iohnson R. Marker-assisted selection[J]. 2004.

Collard B C Y, Mackill D J. Marker-assisted selection: an approach for precision plant breeding in the twenty-first century[J]. Philosophical Transactions of the Royal Society B: Biological Sciences, 2008, 363(1491): 557-572.

Mohan M, Nair S, Bhagwat A, et al. Genome mapping, molecular markers and marker-assisted selection in crop plants[J]. Molecular breeding, 1997, 3(2): 87-103.

Hittalmani S, Parco A, Mew T V, et al. Fine mapping and DNA marker-assisted pyramiding of the three major genes for blast resistance in rice[J]. Theoretical and Applied Genetics, 2000, 100(7): 1121-1128.

Liu J, Liu D, Tao W, et al. Molecular marker‐facilitated pyramiding of different genes for powdery mildew resistance in wheat[J]. Plant Breeding, 2000, 119(1): 21-24.

Hartl D L, Clark A G. Principles of population genetics[M]. Sunderland: Sinauer associates, 1997.

Zhao K, Aranzana M J, Kim S, et al. An Arabidopsis example of association mapping in structured samples[J]. PLoS Genetics, 2007, 3(1): e4.

Myles S, Peiffer J, Brown P J, et al. Association mapping: critical considerations shift from genotyping to experimental design[J]. The Plant Cell Online, 2009, 21(8): 2194-2202.

Tian F, Bradbury P J, Brown P J, et al. Genome-wide association study of leaf architecture in the maize nested association mapping population[J]. Nature genetics, 2011, 43(2): 159-162.

Kump K L, Bradbury P J, Wisser R J, et al. Genome-wide association study of quantitative resistance to southern leaf blight in the maize nested association mapping population[J]. Nature genetics, 2011, 43(2): 163-168.

Mackay I, Powell W. Methods for linkage disequilibrium mapping in crops[J]. Trends in plant science, 2007, 12(2): 57-63.

Riedelsheimer C, Lisec J, Czedik-Eysenberg A, et al. Genome-wide association mapping of leaf metabolic profiles for dissecting complex traits in maize[J]. Proceedings of the National Academy of Sciences, 2012, 109(23): 8872-8877.

Tabor H K, Risch N J, Myers R M. Candidate-gene approaches for studying complex genetic traits: practical considerations[J]. Nature Reviews Genetics, 2002, 3(5): 391-397.

Guo B, Sleper D A, Beavis W D. Nested association mapping for identification of functional markers[J]. Genetics, 2010, 186(1): 373-383.

Flint‐Garcia S A, Thuillet A C, Yu J, et al. Maize association population: a high‐resolution platform for quantitative trait locus dissection[J]. The Plant Journal, 2005, 44(6): 1054-1064.

**Lecture 5 and 6_reference list**

Ruiz M T, Voinnet O, Baulcombe D C. Initiation and maintenance of virus-induced gene silencing[J]. The Plant Cell Online, 1998, 10(6): 937-946.

Miao J, Guo D, Zhang J, et al. Targeted mutagenesis in rice using CRISPR-Cas system[J]. Cell research, 2013, 23(10): 1233.

Waterhouse P M, Helliwell C A. Exploring plant genomes by RNA-induced gene silencing[J]. Nature Reviews Genetics, 2003, 4(1): 29-38.

Urnov F D, Rebar E J, Holmes M C, et al. Genome editing with engineered zinc finger nucleases[J]. Nature Reviews Genetics, 2010, 11(9): 636-646.

Porteus M H, Carroll D. Gene targeting using zinc finger nucleases[J]. Nature biotechnology, 2005, 23(8): 967-973.

Li X, Song Y, Century K, et al. A fast neutron deletion mutagenesis‐based reverse genetics system for plants[J]. The Plant Journal, 2001, 27(3): 235-242.

Caldwell D G, McCallum N, Shaw P, et al. A structured mutant population for forward and reverse genetics in Barley (Hordeumvulgare L.)[J]. The Plant Journal, 2004, 40(1): 143-150.

Burch‐Smith T M, Anderson J C, Martin G B, et al. Applications and advantages of virus‐induced gene silencing for gene function studies in plants[J]. The Plant Journal, 2004, 39(5): 734-746.

Li X, Lassner M, Zhang Y. Deleteagene: a fast neutron deletion mutagenesis‐based gene knockout system for plants[J]. Comparative and functional genomics, 2002, 3(2): 158-160.

Rogers C, Wen J, Chen R, et al. Deletion-based reverse genetics in Medicagotruncatula[J].

Plant physiology, 2009, 151(3): 1077-1086.

Walsh R M, Hochedlinger K. A variant CRISPR-Cas9 system adds versatility to genome engineering[J]. Proceedings of the National Academy of Sciences, 2013, 110(39): 15514-15515.

Jinek M, Chylinski K, Fonfara I, et al. A programmable dual-RNA–guided DNA endonuclease in adaptive bacterial immunity[J]. Science, 2012, 337(6096): 816-821.

Cong L, Ran F A, Cox D, et al. Multiplex genome engineering using CRISPR/Cas systems[J]. Science, 2013, 339(6121): 819-823.

Becker A, Lange M. VIGS–genomics goes functional[J]. Trends in plant science, 2010, 15(1): 1-4.

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**Course title**

## Immunology and Biophysics Part I—Lipid Droplet Biology

**Instructor(s)-in-charge:**

*Prof. LIU Pingsheng*

**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:**

| section | content | | hours | Date |
|---|---|---|---|---|
| 1 | **Introduction of Biophysics 1** | Macromolecules | 4 | Sep. 11 |
| 2 | **Introduction of Biophysics 2** | Cellular organelles | 4 | Sep. 18 |
| 3 | **Introduction of Lipid Droplets** | History<br>Distributions<br>Difference with lipoproteins and other cellular organelles<br>Recent progress<br>Uncertainty and problems<br>Future studies | 4 | Sep. 25 |
| 4 | **Structural Proteins and Protein Composition** | Structural Proteins:<br>PLINs<br>Oleosins<br>MPL, MLDP, MLDS, YLDPs, CLDPs<br>Protein Composition:<br>Lipid synthetic and catalytic<br>Membrane trafficking<br>Signaling<br>Protein degradation | 4 | Oct. 9 |
| 5 | **Formation and Functions** | Formation:<br>Biogenesis<br>Growth and degradation<br>Fusion and fission<br>Functions:<br>Storage<br>Trafficking (movement and interaction with other cellular organelles)<br>Lipid synthesis | 4 | Oct. 16 |

| | | | | |
|---|---|---|---|---|
| | | Signaling<br>Protein degradation | | |
| 6 | **Lipid Droplets in Mammals and Other Organisms** | Mammals:<br>Adipose tissue<br>Mammary gland<br>Liver<br>Macrophages<br>Lymphocytes<br>Muscle<br>Other mammalian cells<br>Plants:<br>Plant seeds<br>Chloroplasts<br>Genetic Model Organisms:<br>Drosophila<br>C. elegans<br>Microorganisms:<br>Yeast<br>Green algae<br>Bacteria | 4 | Oct. 23 |
| 7 | **Methods in Lipid Droplet Biology** | Isolation<br>Proteomics<br>Imaging<br>Fusion<br>Fission<br>Movement<br>Genetic screen | 4 | Oct. 30 |
| total | | | 28 | |

**Course material:**

*All references are list in course ppt.*

*You are welcome to copy the ppt.*

**Course title**

## Immunology and Biophysics Part II—Immunology

**Instructor(s)-in-charge:**

*Prof. FANG Min*

**Course type:**

*Lecture*

**Catalog Description:**

*Immunology 2017 is designed as an introduction 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 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 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**<br>General Properties of Immune Responses;<br>Cells and Tissues of the Immune Systems;<br>The development stages of Immunology. | 4 | Nov.6 |
| 2 | **Innate Immunity**<br>Dendritic Cells, Macrophages, NK cells, NKT cells and other innate like T and B lineages | 4 | Nov.13 |
| 3 | **NK cell development and function**<br>NK cell development and differentiation; The role of NK cells in anti-tumor and anti-infections; Memory NK cells. | 4 | Nov.20 |
| 4 | **Immunoglobulins and B lymphocytes**<br>Immunoglobulins: Structure and Function;<br>Antigen-antibody interactions and Monoclonal Antibody; B lymphocytes Development and Biology; B lymphocytes Signaling Mechanisms and Activation. | 4 | Nov. 27 |
| 5 | **T lymphocytes**<br>T cell Antigen Receptors; T lymphocyte Signaling Mechanisms and Activation; Development of T cells; | 4 | Dec.4 |

| | | | |
|---|---|---|---|
| | Peripheral T lymphocyte responses and Function. | | |
| 6 | **Major Histocompatibility Complex (MHC) Molecules and Antigen Presentation**<br>MHC Structure, Function, and Genetics; Cell Biology of Antigen Processing and Presentation. | 4 | Dec.11 |
| 7 | **Immunity to infectious Agents**<br>The Immune Responses to Parasites and bacteria; Immunity to Viruses; Vaccines. | 4 | Dec.18 |
| 8 | **The Immune System in Disease**<br>Immunity to Tumors; Systemic Autoimmunity; Transplantation Immunology; Primary Immunodeficiency Diseases. | 4 | Dec.25 |
| total | | 32 | |

**Course title**

## Developmental Biology Part I

**Instructor(s)-in-charge:**

*Prof. YUAN Li*

**Course description:**

*Developmental Biology 2017 is designed as a course of developmental biology for postgraduate students in biology field. The course will give students a general view of developmental biology, which covers several important topics of developmental biology, including a general introduction of developmental biology, gametogenesis, embryonic development, organogenesis, morphogene and developmental signaling, development and dynamics.*

**Course type:**

*Lecture, mini-seminar, discussions*

**Notes:**

*Powerpoint slides for each lecture will be posted on the Course web site 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 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.*

**Grading information:**

*Components of Developmental Biology Part I 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**

| section | content | hours | Date |
|---|---|---|---|
| 1 | Introduction and approaches to developmental biology | 4 | Sep.12 |
| 2 | Cell-cell communication in development | 4 | Sep.19 |
| 3 | Germ cells, fertilization and sex determination | 4 | Sep.26 |
| 4 | Introducing early embryonic development;<br>Major model animals - the big six;<br>Early development in amphibians | 4 | Oct.10 |
| 5 | Early development in birds and mammals;<br>Drosophila Development and axis Formation | 4 | Oct.17 |
| 6 | Organogenesis:<br>Paraxial and Intermediate Mesoderm<br>1. Paraxial mesoderm: somitogenesis<br>2. Intermediate mesoderm: the urogenital system | 4 | Oct.24 |
| 7 | Repetition;<br>Open-book examination | 4 | Oct.31 |
| total | | 28 | |

**Course title**

## Developmental Biology Part II—Plant Development Biology

**Instructor(s)-in-charge:**

*Prof. CHENG Youfa*

**Course type:**

*Lecture, mini-seminar, discussions*

**Catalog Description:**

*Developmental Biology Part II is designed as an introduction course of plant developmental biology for graduate students. In this course, we will discuss developmental events during plant life and the underlying mechanisms controlling such developmental processes. 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 Developmental Biology | 4 | Nov. 7 |
| 2 | Hormone and Signal Transduction in Plants | 4 | Nov. 14 |
| 3 | Embryogenesis | 4 | Nov. 21 |
| 4 | Stem Cell and Meristem | 4 | Nov. 28 |
| 5 | Organogenesis | 4 | Dec. 5 |
| 6 | Flowering and Flower Development | 4 | Dec. 12 |
| 7 | Gametophytes, Pollination,Seeds, and Fruits | 4 | Dec. 19 |
| 8 | Exam | 4 | Dec. 26 |
| | | 32 | |

**Course title**

## Climate Change, Environmental and Natural Resources Management Part I—Climate Change

**Instructor(s)-in-charge:**

*Prof. KANG Shichang*

**Course type:**

*Lecture*

**Catalog Description:**

*Climate Change 2017 fall semester is designed as an introductory course in the **Climate Change** for graduate students majored in Earth Sciences. The class will give students anoverview of climate system and its changes as well as some detailed recent development 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 and predictions of the changes, multisphere interactions in Earth surface, 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 | **Overview of Climate Change**<br>1.1 Climate System<br>1.2 What Has Changed?<br>1.3 Why Has It Changed?<br>1.4 How Will It Change? | 4 | Sep. 11 |
| 2 | **Changes in Atmospheric Composition**<br>2.1 Aerosols and Precurses<br>2.2 Short Lived Gases<br>2.3 Well Mixed Greenhouse Gases<br>2.4 Toxic Species | 4 | Sep. 18 |
| 3 | **Changes in Atmospheric Circulation and Climate extremes**<br>3.1 Atmospheric Circulation and Patterns of Variability<br>(sea level, pressure, surface wind speed, tropospheric geopotential height and tropopause, tropical circulation, jets, storm tracks and weather types, stratospheric circulation,changes in indices of climate variability)<br>3.2 Climate Extreme Events (temperature extremes, extremes of the hydrological cycle, tropical storms) | 4 | Sep. 25 |
| 4 | **Changes in the Cryosphere**<br>4.1 Glacier<br>4.2 Ice Sheet<br>4.3 Permafrost<br>4.4 seasonal Snow | 4 | Oct. 9 |

| | | | |
|---|---|---|---|
| | 4.5 Sea Ice<br>4.6 Other Ice | | |
| 5 | **Changes in hydrological cycle**<br>5.1 Precipitation<br>5.2 Streamflow and runoff<br>5.3 Evapotranspiration including Pan Evaporation<br>5.4 Surface and tropospheric humidity<br>5.5 Clouds | 4 | Oct. 16 |
| 6 | **Modeling Climate Change and Prediction**<br>6.1 Anthropogenic and Natural Radiative Forcing<br>6.2 CMIP5<br>6.3 Regional Climate Model<br>6.4 Climate Prediction | 4 | Oct. 23 |
| 7 | **Effects of Climate Changes**<br>7.1 Water resources<br>7.2 Ecosystem<br>7.3 Human Health<br>7.4 Natural hazard<br>7.5 Global transportation<br>7.6 Infrastructure<br>7.7 Future Earth<br>7.8 Others | 4 | Oct. 30 |
| Total | | 28 | |

**Course title**

## Climate Change, Environmental and Natural Resources Management Part II—Environmental and Natural Resource Economics

**Instructor(s):**

*Prof. DENG Xiangzheng*

**Course type:**

*Lecture*

**Catalog Description:**

*Environment and Natural Resource Management 2017 fall semester is designed as an introduction course of the* ***Environmental and Natural Resource Economics****for research postgraduates in Environmental Sciences field. The class will give students a general view of Environment 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**<br>1.1The Human–Environment Relationship:<br>-the role of economics;<br>-studying human behavior in a laboratory;<br>-the environment as an asset.<br>1.2Environmental Problems and Economic Efficiency:<br>-property rights and efficient market allocation;<br>-improperly designed property rights systems;<br>-the pursuit of efficiency.<br>1.3Externalities as a Source of Market Failure:<br>-public goods;<br>-imperfect market structures;<br>-government failure;<br>-an efficient role for government. | 4 | Nov. 6 |
| 2 | **Evaluating Trade-Offs**<br>2.1Normative Criteria for Decision Making:<br>-pollution control;<br>-preservation *versus*development;<br>-issues in benefit estimation.<br>2.2Approaches to Cost Estimation:<br>-the Treatment of Risk;<br>-distribution of benefits and costs;<br>-choosing the discount rate;<br>-divergence of social and private discount rates;<br>-cost-effectiveness analysis; | 4 | Nov. 13 |

| | | | |
|---|---|---|---|
| | -impact analysis.<br>2.3Valuing the Environment:<br>-identification of types of values of environment;<br>-classification of valuation methods;<br>-preference based models (stated preference, revealed preference, travel cost, hedonic property and wage, averting expenditure).<br>2.4GIS based modeling works:<br>-examples and practices. | | |
| 3 | **Dynamic Efficiency and Sustainable Development**<br>3.1Efficiency vs Equality:<br>-atwo-period model;<br>-defining intertemporal fairness;<br>-efficient allocations and sustainability criterion.<br>3.2Sustainable Development:<br>-market allocations;<br>-efficiency and sustainability;<br>-trade and environment.<br>3.3Environmental Policy for Sustainable Development:<br>-implications for environmental policy;<br>-depletable resource allocation;<br>-efficient intertemporal allocation;<br>-market allocation of depletable resource. | 4 | Nov. 20 |
| 4 | **Replenishable but Depletable Resources: Water**<br>4.1The Potential for Water Scarcity:<br>-the efficient allocation of scarce water;<br>-water transfers;<br>-water markets;<br>-water prices;<br>-GIS and water resource.<br>4.2Watershed based efficiency and cost-effectiveness:<br>-nature of water pollution problem;<br>-water pollution control.<br>4.3Mini-seminars:<br>-student presentations and discussion. | 4 | Nov. 27 |
| 5 | **A Locationally Fixed, Multipurpose Resource: Land**<br>5.1The Economics of Land Allocation:<br>-land use;<br>-land use conversion;<br>-examples and practices.<br>5.2Efficiency of land use:<br>-sources of inefficient use and conversion;<br>-innovative market-based policy remedies;<br>-establishing property rights;<br>-transferable development rights.<br>5.3Mini-seminars:<br>-student presentations and discussion. | 4 | Dec. 4 |
| 6 | **Reproducible Private Property Resource: Agriculture and Food Security**<br>6.1Global Scarcity and food security:<br>-outlook for the future;<br>-the role of agricultural policies;<br>-distribution of food resource.<br>6.2Climate changes and food security: | 4 | Dec. 11 |

| | | | |
|---|---|---|---|
| | -feast and famine cycles;<br>-examples and summary,<br>6.3Mini-seminars:<br>-student presentations and discussion. | | |
| 7 | **Land Storable, Renewable Resources: Forests**<br>7.1Sources of Inefficiency:<br>-perverse incentives for the landowner and nations;<br>-poverty and debt;<br>-sustainable forestry.<br>7.2Public Policy:<br>-carbon sequestration credits;<br>-REDD.<br>7.3Mini-seminars:<br>-student presentations and discussion. | 4 | Dec. 18 |
| 8 | **Economics of Pollution Control**<br>8.1 The Efficient Allocation of pollution:<br>-apollutant taxonomy;<br>-market allocation of pollution;<br>-efficient policy responses.<br>8.2PolicyAnalysis:<br>-cost-effective policies for uniformly mixed fund pollutants:<br>-cost-effective policies for nonuniformlymixed surface pollutants:<br>-responses to changes in the regulatory environment;<br>-price volatility;<br>-instrument choice under uncertainty;<br>-product charges as an indirect form of environmental taxation.<br>8.3Air Pollutions:<br>-conventional pollutants;<br>-cost-effectiveness of the command-and-control approach;<br>-innovative approaches;<br>-regional pollutants.<br>8.4 Mini-seminars:<br>-student presentations and discussion. | 4 | Dec. 25 |
| Total | | 32 | |

**Course title**

## Earth System Science Part I—Introduction to Remote Sensing

**Instructor(s)-in-charge:**

*Prof. Fang Chen*

**Course type:**

*Lecture*

**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. Each student is expected to give a 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 presentations will be limited to 10 minutes and Q&A will be limited to 5 minutes. 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*

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 10.*
2. *Write a short (3-4 page) paper on topic of **the use of remote sensing for disaster management**. DUE in class, October 31.*

**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 12* | *-Ch.1,3* | |
| 2 | *Image Processing/RS Applications* | *September 19* | | |
| 3 | *Remote Sensing for Disaster Management* | *September 26* | | |
| 4 | *Remote Sensing of Vegetation-Spectral/Temporal Characteristics, Indices, and Change Detection* | *October 10* | *-Ch.11,12* | *Assignment-1 due by beginning of class* |
| 5 | *Remote Sensing of Water, Soil, and Urban Areas* | *October 17* | *-Ch.13,14* | |
| 6 | *Students presentation* | *October 24* | | |
| 7 | *Students presentation* | *October 31* | | *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:

```
ESSAY2016-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—Introduction to Geodynamics

**Instructor(s)-in-charge:**

*Prof. WANG Shimin*

**Course type:**

*Lecture*

**Course Assessment:**

*Homework: 7 assignments*

**Grading Policy:**

*50% homework, 50% final report.*

**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; Stress and strain in solids | 4 | Nov. 7 |
| 2 | Elasticity and flexure | 4 | Nov. 14 |
| 3 | Heat transfer | 4 | Nov. 21 |
| 4 | Gravity | 4 | Nov. 28 |
| 5 | Fluid mechanics | 4 | Dec. 5 |
| 6 | Rock rheology | 4 | Dec. 12 |
| 7 | Faulting | 4 | Dec. 19 |
| 8 | Flows in porous media | 4 | Dec. 26 |
| total | | 32 | |

**Textbook**

D. L. Turcotte and J. Schubert, Geodynamics, Third Edition, Cambridge University Press, 2014.

**Course title**

## Functional Nanostructure: Synthesis, Characterizations and Device Applications

**Instructor(s)-in-charge:**

*Prof. HE Jun*

**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 14<br>September 21 |
| 2 | Low dimensional semiconductors growth | 8 | September 28<br>October 12 |
| 3 | Low dimensional semiconductor: device applications | 8 | October 19<br>October 26 |
| 4 | Student presentation | 4 | November 2 |
| 5 | Histories and principles of organic electronics | 4 | November 9 |
| 6 | Preparation of organic electronic nanomaterials | 4 | November 16 |
| 7 | Properties and applications of organic functional materials | 4 | November 23 |
| 8 | Electron microscopic characterization | 4 | November 30 |

| | | | |
|---|---|---|---|
| | of nanomaterials | | |
| 9 | Spectroscopic characterization of nanomaterials | 4 | December 7 |
| 10 | Applications of nanomaterials in nanomedicine | 4 | December 14 |
| 11 | Student presentation | 4 | December 21 |
| 12 | Lab Tour | 2 | December 28 |
| 13 | Exam | 2 | December 28 |
| 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**

## Introduction of Metallurgical Engineering and Environmental Sciences Part I

**Instructor(s)-in-charge:**

*Prof. DU Hao*

**Course type:**

*Lecture*

**Course Schedule:**

*Listed in the table below.*

**Course Assessment:**

*Homework: 6 assignments, will be given after each class, extensive literature reading is expected.*

**Grading Policy:**

*Assignments 40%, Final 40%, Attendance 20%*

**Course Prerequisites:**

*College Chemistry, College Mathematics, English.*

**Catalog Description:**

*This course includes two sections. First, the introduction of different metallurgical processes to recover some of the more important industrial metals; 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 metallurgical processes and environmental issues related.*

**Schedule of the course**

| section | content | hours | Date |
|---|---|---|---|
| 1 | Introduction of metallurgical engineering and environmental science. | 4 | Sep. 15 |
| 2 | Steel making processes and environmental issues involved. | 4 | Sep. 22 |
| 3 | Alumina production processes and environmental issues involved. | 4 | Sep. 29 |
| 4 | Titanium production processes and environmental issues involved. | 4 | Oct. 13 |
| 5 | Gold and copper production processes and environmental issues involved. | 4 | Oct. 20 |
| 6 | Chromium and manganese production processes and environmental issues involved. | 4 | Oct. 27 |
| 7 | Lithium, rare earth metals, and electronic wastes. | 4 | Nov.3 |
| total | | 28 | |

**Textbook and any related course material:**

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

**Course title**

## Introduction of Metallurgical Engineering and Environmental Sciences Part II—Multi-Phase Chemical Reaction Engineering and Technology

**Instructor(s)-in-charge:**

*Prof. LIU Xiaoxing & Prof. LU Bo-na*

**Course type:**

*Lecture*

**Course Assessment:**

*Homework: 8 assignments*

**Grading Policy:**

*Typically 60% homework, 20% each midterm, 20% final.*

**Course Prerequisites:**

*Familiar with the basic knowledge of multi-phase (gas, liquid, solid) system, fluid mechanics, thermal conduction and mass transmission.*

**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 transfercharacteristics 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 introduce of the characterization and classifications of multi-phase flow phenomena. The heaviest parts of this course will be contributed to the introduce 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 | Date |
|---|---|---|---|
| 1 | Multi-phase reactors and their applications: a general review | 4 | Nov. 10 |
| 2 | Fundamentals of multi-phase hydrodynamics: classification of powders, phase interaction, fluidization phenomena, and flow regimes | 4 | Nov. 17 |
| 3 | Dense gas-solid fluidization technology: Essential elements of fluidized bed, hydrodynamics, regimes, regime transitions, applications. | 4 | Nov. 24 |
| 4 | Circulating fluidized bed: hydrodynamics, system instability, mixing, modeling, and applications. | 4 | Dec. 1 |
| 5 | Heat transfer phenomena in multi-phase reactors: | 4 | Dec. 8 |

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|---|---|---|---|
| | mechanism and theories for different models of heat transfer, experimental characterizations. | | |
| 6 | Scaling of multi-phase reactors: typical multi-phase reactor models, their applications and limitations | 4 | Dec. 15 |
| 7 | Experimental equipment, measurement techniques, and instrumentation of multi-phase reactors. | 4 | Dec. 22 |
| 8 | Industrial applications of multi-phase reactors | 4 | Dec. 29 |
| total | | 32 | |

**Textbook and any related course material:**

**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.

**Course title**

## Organometallic Chemistry

**Instructor(s)-in-charge:**

*Prof. SUN Wenhua & Associate Prof. YANG Wenhong*

**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% for each assessment (4 times), 20% final.*

**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. 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<br>Periodic Table of Elements | 4 | Sep. 13 |
| 2 | Coordination Chemistry: bonds, coronation numbers, ligands and valences, | 4 | Sep. 20 |
| 3 | Alkali Metal Organometallics<br>Alkaline Earth Metal Organometallics | 4 | Sep. 27 |
| 4 | Zinc, Cadmium, and Mercury organometallics<br>Stoichiometric reactions | 4 | Oct. 11 |
| 5 | Organometallics of the Boron Group | 4 | Oct. 18 |
| 6 | Organometallics of the Carbon group | 4 | Oct. 25 |
| 7 | Transition metal Organometallics: Common types of organometallic complexes; 16/18 ev; ligand types and behaviors and oxidation states | 4 | Nov. 1 |

| | | | |
|---|---|---|---|
| 8 | Metal Carbonyl Complexes: Definition and types; from mononuclear to nanoparticles; industrial hydroformylation | 4 | Nov. 8 |
| 9 | Organometallic compounds ligated by alkenes, dienes, and alkynes | 4 | Nov. 15 |
| 10 | Metallocene and Arene complexes | 4 | Nov. 22 |
| 11 | Sigma Complexes | 4 | Nov. 29 |
| 12 | Organometallic application: C-C and C-N cross couplings | 4 | Dec. 6 |
| 13 | Industrial processes: ethylene oligomerization and olefin polymerization | 4 | Dec. 13 |
| 14 | Student presentations (interpretation conceptual novelty to literature) | 4 | Dec. 20 |
| 15 | Q and A sessions | 2 | Dec. 27 |
| 15 | **Open note test (notebook and files within personal computer allowed, but not any text books)** | 2 | Dec. 27 |
| | Official hour every week by Prof. SUN Wenhua and Prof. YANG Wenhong, 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**
## 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 3-hour lectures, 16 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.*