THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY
Approval of Undergraduate Course

Section 1: Academic Administration [1]

1.1 Catalog

a) Course to be effective from: Academic Year 2021-2022 Term Fall

b) Department Code[3]: CHEM Subject Area[3]: ***CHEM*** Course Number [4]: **2555**

Previous Course Code[5]:

c) Full Title[6] *(max. 100 characters)*: Molecular Characterization Chemistry Laboratory I

d) Abbreviated Title[7] *(max. 30 characters)*:

e) Course Credits[8]: (X) Fixed: 2 ( ) Range: From To

f) Catalog Description[9] *(word limit = 150)*:

This is the laboratory course corresponding to the lectures of CHEM 2410 Physical Chemistry I and CHEM 2310 Fundamentals of Analytical Chemistry. The topic of experiments covered in this course are closely connected with the topics covered in the lecture courses, such as electrochemical equilibrium, chemical instrumental analysis, thermodynamics, etc. For CHEM students only.

g) Grading Type[10]: (X) Letter Grades ( ) Distinction/Credit/Pass/Fail ( ) Pass/ Fail ( ) Distinction/Pass/Fail [ ] Others *(please specify)*:

h) [x] Prerequisites[11]:

Course Code / Public Exam	Course Title / Exam Subject and Level / Grade attained
CHEM 1050	Lab for General Chemistry I
(CHEM 2409 OR MATH 2351)	Mathematical Methods for Physical Chemistry OR Introduction to Differential Equations

i) [x] Corequisites[12]:

Course Code	Course Title
CHEM 2310	Fundamentals of Analytical Chemistry
CHEM 2410	Physical Chemistry I: Equilibrium Thermodynamics and Statistical Mechanics

j) [x] Exclusions[13]:

Course Code / Public Exam	Course Title / Exam Subject and Level / Grade attained
CHEM 2355	Fundamental Analytical Chemistry Lab

k) [ ] Co-listing[14]: [ ] Multi-coding[14]:

Course Code	Course Title

l) Other Enrollment Restrictions[15] ( ) No ( ) Yes

[ ] Instructor's approval required

[x] Restricted to specified student group(s) *(please specify, e.g. year and program of study)*: For CHEM Major students

[ ] Others *(please specify)*:

m) Medium of Instruction/Materials[16]: (x) English ( ) Others, (Pls specify and provide a justification in Section 1.3): _____

n) Allow course repetition for credit[17]: (x) No ( ) Yes

1.2 *Contribution of course to Programs of Study* [Check all appropriate boxes below]

[x] Major

Program of Study	As		
BSc. in Chemistry	[x] Required Course	[ ] Elective	[ ] Prerequisite

[ ] Minor

Program of Study	As		
	[ ] Required Course	[ ] Elective	[ ] Prerequisite

[ ] Common Core

[ ] Others (pls specify):

Program of Study	As		
	[ ] Required Course	[ ] Elective	[ ] Prerequisite

1.3 *Rationale for Introducing this course and other relevant information* [18]

This is a practical course designed for students who are taking the lectures of Physical Chemistry I and Fundamentals of Analytical Chemistry, in which it provides students some hands-on experience, with the use of analytical instruments or physical equipment, to apply what they learned in lectures in practical term. The main topics include electrochemical equilibrium, GC-FID analysis, etc.

Section 2A: Learning Outcomes and Alignment *(for courses not proposed to be Common Core Courses)*

2.1 *Key Course Intended Learning Outcomes (Should not normally exceed six or eight outcomes)*

Upon completion of this course, students are expected to be able to do the following:

	Course ILOs	**Nature of the learning outcomes** *(A - Knowledge/Content Related; B - Academic Skills/Competencies; C - Others)*
1	Apply the instrumental techniques to analytical chemical analyses.	A, B, C
2	Demonstrate physical chemical principles by practical experiments.	A, B, C
3	Conduct lab analysis following lab procedures independently.	B, C
4	Calculate, explain and interpret experimental data.	A, B
5		
6		
7		
8		

2.2 *Contribution of Learning Outcomes to Programs of Study identified in Section 1.2*

(Please also complete Section 4.1)

	Program of study 1: B Sc in Chemistry **Program ILOs**	**To be achieved through these course ILOs** *(Write CILO-1, CILO-2, etc.)*
1	Explain the essential facts, principles and theories across the four principal areas of chemistry, i.e. analytical, organic, inorganic and physical.	CILO 1, CILO 2, CILO 4
2	Analyze and interpret experimental data, critically assess data in literature and extract useful data from it.	CILO 4
3	Conduct standard laboratory procedures involved in synthetic and instrumental work.	CILO 1, CILO 2, CILO 3
4	Operate a range of chemical instrumentation with adequate hands-on experiences.	CILO 1, CILO 2, CILO 3
5	Assess and manage the risks of chemical substances and laboratory procedures by evaluating their potential impact on the environment.	CILO 1, CILO 2, CILO 3
6	Demonstrate self awareness, work independently and collaborate effectively with other people in a team.	CILO 1, CILO 2, 3 CILO
7		
8		

	Program of study 2: _____ **Program ILOs**	**To be achieved through these course ILOs** *(Write CILO-1, CILO-2, etc.)*
1		
2		
3		
4		
5		
6		
7		
8		

Section 2B: Additional Information[2] *(for courses not proposed to be Common Core Courses)*

2.3 Planned Teaching & Learning Arrangement

	Teaching & Learning Arrangement	Weekly Scheduled Hours/ Estimated Weekly Learning Hours	Indicate which course ILOs this activity serves to achieve *(Write CILO-1, CILO-2, etc.)*	Additional Information *(optional)*
Face-to face activities	☐ Lecture*			
	☒ Tutorial*	1	CILO 1, CILO 2, CILO 4	
	☐ Seminar/Small-class*			
	☒ Laboratory*	3	CILO 1, CILO 2, CILO 3, CILO 4	
	*Does the above scheduled component(s) involve structured active learning activities? [19] (x) No ( ) Yes *If yes, please specify for each scheduled component, the percentage and the type of active learning involved in the "Additional Information" column.*			
	☐ Others (e.g. fieldtrip, visit, etc.), *pls specify:* _____			
Online activities	☐ Online lecture videos			
	☐ Other online learning tasks, *pls specify:* _____			
	The total learning hours of the course# is equivalent to 30 **hours** [8] *# including both scheduled instructional hours and hours for self-study activities & assessment*			

- *For course adopting a pedagogic approach other than lecture, tutorial and laboratory, please indicate the pedagogy used:*

( ) Blended learning [20] ( ) Pure online delivery [21]

( ) Experiential learning [22] ( ) Others, *pls specify:*_____

2.4 Planned Assessment Weightings

Assessment Task	Proportion of Final Grade (%)	Indicate which course ILOs this task is to assess *(Write CILO-1, CILO-2, etc.)*	Additional Information *(optional)*
☒ In-class test	20	CILO 1, CILO 2, CILO 4	
☐ Mid-term test			
☐ Final exam			
☒ Written assignment	60	CILO 1, CILO 2, CILO 3, CILO 4	
☐ Project report			
☐ Presentation			
☐ Learning portfolio			
☐ Course participation			
☐ Peer evaluation			
☒ Others (e.g. proctored online exam, etc.), *pls specify:* Lab Performance	20	CILO 3	

2.5 *Course Duration*

(x) 1 term ( ) 2 terms ( ) Others, *pls specify:* _____

2.6 *Planned Frequency of Offerings* *[Check all appropriate boxes]:*

[x] Every Fall
[ ] Every Spring
[ ] No fixed pattern
[ ] Other *(pls specify):* _____
[ ] Every Winter
[ ] Every Summer

2.7 *Course outline attached* (x) No ( ) Yes

- **Internationalization:**

Internationalization in a course refers to course content and/or pedagogic approaches which incorporate an intercultural and international perspective. Examples may include:

- Collaboration with overseas institutions to develop and adopt international course content, or to arrange international field trip
- Insertion of international theme as part of the course
- Integrating the course content with international material as examples or case studies
- Elements to provide global diversified perspectives and/or practices around the world

Please briefly list or summarize any component(s) in the course that contributes to internationalizing the curriculum:

2.8 *Resources*

Request extra resources for teaching this course? (x) No ( ) Yes

Section 4: Development, Concurrence and Approval

4.1 *Contribution to the Program Learning Outcomes*

(To be completed by EACH of the program(s) of study noted under Section 1.2)

[x] The course contributes to this Major/~~Minor~~* Program: *BSc. in Chemistry* (* Delete as appropriate)			
[ ] The relevant **program learning outcomes are attached**.			
[ ] On behalf of this program of study, I confirm that the course will contribute appropriately to overall program learning outcomes.			
	Position / Name:	Signature	Date
Program Director / ~~Head of Department~~:	Prof. Xuhui Huang/ UG Coordinator		28 Oct. 2020

[ ] The course contributes to this Major/Minor* Program: (* Delete as appropriate)			
[ ] The relevant **program learning outcomes are attached**.			
[ ] On behalf of this program of study, I confirm that the course will contribute appropriately to overall program learning outcomes.			
	Position / Name:	Signature	Date
Program Director / Head of Department:			

4.2 *Approvals*

Department/Program unit level Recommendation			
	Position / Name:	Signature	Date
[x] Offering Department/Program Unit: *(Please specify unit):CHEM*	Prof. Xuhui Huang/ UG Coordinator		28 Oct. 2020
[ ] Recommending School/IPO: *(Please specify):* SCIENCE	Prof Pak Wo LEUNG Associate Dean of Science		9/11/2020

School-level Concurrence				
	Name of School/Unit	Position / Name	Signature	Date
[x]				
[ ]				
[ ]				
[ ]				
[ ]				

Notes:

(1) Academic Administration
Information in these sections will be considered by the Committee as a basis for approval of the proposed new course.

(2) Additional Information
Data in this section does not require approval of the Committee. It is presented to the Committee only as supplementary information to assist the Committee in evaluation of the course.

(3) Department Code and Subject Area
They refer to the offering department and the discipline of the course. For instance, a Global Business course should put "SBM" in the field of "Department Code" and "GBUS" in "Subject Area".

(4) Course Number
1xxx = an introductory course; 2xxx = an intermediate course; 3xxx/4xxx = an advanced course / course for specialist study

(5) Previous Course Code
Applicable only if the course had been offered before as a special topics course.

(6) Full Title
The title will appear in all official documents. Max. length = 100 characters (spaces included)

(7) Abbreviated Title
Should be a direct abbreviation of the title. An abbreviated title must be provided when the full title exceeds 30 characters (including space).

(8) Course Credits and Total Learning Hours
In the assignment of credits to courses, reference should be made to the 'benchmark' assignment of 3 credits for courses with 3 instructional hours per week for a full term, and requiring 2 hours per week of self-study activities for each instructional hour. This benchmark implies a total of 40 to 50 learning hours per credit. For this calculation, 'instructional hours' means all required, scheduled hours of instruction.
It should be noted that the hours for all scheduled components and other teaching activities may not add up to the total learning hours of a course, for the reason that students may be expected to engage in other self-study activities and/or assessment that are not listed as teaching arrangements under Section 2.3

(9) Catalog Description
Provide an outline of the course in about 30 words (3 lines) (Max word count = 150). See the current issue of Course Catalog for reference formats..

(10) Grading Type
The default grading type for courses is letter grades. If a course adopts a grading type other than letter grades, such as PP, P/F or DI/PA/F, it will be specified in the course description for easy reference by students.

(11) Prerequisite(s)
A prerequisite may be an attainment in public examination or an existing/previously offered course (including special topics courses). The prerequisite must be obtained, or taken and passed before a student may register for credit in this (proposed) course.

(12) Corequisite(s)
A corequisite is a course which must be taken prior to, or at the same time as, the specified course.

(13) Exclusion(s)
Students who have achieved a specified attainment in public examinations or have completed, or are registered in, a specified course may not register for credit in an excluded course.

(14) Co-listing and Multi-coding
Co-listed courses are two or more courses that share the most or all lectures and other learning activities, but differ at least partially in assessment schemes or assignments under each of the courses. Proposal that involves co-listing request should be accompanied by a separate, duly completed form for co-listing and submitted to the CUS Secretariat.
A multi-coded course is a single course that is offered under two or more course codes with identical course content and assessment scheme. Proposal that involves multi-coding request should include in section 1.3 the necessary supporting information, i.e. (i) rationale for the multi-coding request including evidence that the course has sufficient elements in the subject area of the new code requested, and that the requested new code could benefit the students by reflecting their affiliation with a particular discipline; and (ii) confirmation that students registered under different codes of the course are treated identically with only one set of course content and assessment arrangement..

(15) Other Enrollment Restrictions
Enrollment restrictions are set to restrict the class enrollment to a specified group of students (e.g. "For Science students in their second year of study", "For GBUS students only", "For students with instructor's approval only") on top of prerequisites/corequisites. For most cases, departments/units do not need to set fixed enrollment restrictions and tick the box "No". They can work out a "reserved quota" with ARR, Academic Registry per each time of course offering to prioritize certain groups of students (e.g. students studying relevant major or minor programs).
If enrollment restrictions are set, please tick the box "Yes" and specify what enrollment restrictions are. In case of changes to the enrollment restrictions, a course change proposal should be submitted.

(16) Medium of Instruction/Materials
Exceptions to the general University policy that English is the medium of instruction will only be permitted when the courses are related to the area of Chinese studies and are approved by the School of Humanities and Social Science. Courses approved to be taught in Chinese will carry a [PU] or [CA] notation in the course description, which indicates the spoken language used in teaching: [PU] stands for Putonghua; and [CA] for Cantonese. Courses marked with a [C] in the catalog description are not taught in Chinese but may require students to read materials in Chinese.
Some courses may use different medium of instruction/materials, either in Chinese or English, for different sections. They will be denoted by a combination of [CA], [PU], [C] and [EN]. Students are expected to check the medium of instruction/materials to be used before course enrollment.

(17) Allow course repetition for credits
In general, students who have passed a course may not repeat the same course. However, for some courses such as special topics, seminars, directed studies, service learning, study trips, internships and so forth, departments may propose that the course may be repeated for credit.

(18) Rationale for introducing this course and other relevant information
Other relevant information includes, *e.g., justification for using language other than English as the medium of instruction/materials, the reason for allowing students to repeat the course for credits, rationale for requesting multi-coding arrangement.*

(19) ***Structured Face-to-face Active Learning Activities***
Structured face-to-face active learning activities generally include in-class small group discussions, small group problem solving sessions, presentations with peer-evaluation, hands-on prototype building and design, and other learning activities where students are engaged in very active learning modes while the instructor(s) and TA(s) play the facilitator role. Tutorials where instructors or TAs teach problem solving and give examples on the board, or laboratory sessions with very procedural step-by-step experiments in which students note observations and record data, and complete a lab report after the lab are not considered as structured face-to-face active learning.

(20) ***Blended Learning*** *(subject to the final wordings of definitions to be adopted in the UAA exercise)*
At HKUST, blended learning usually refers as a blend of online and face-to-face teaching, where the online component may be in form of online video lectures/demonstrations, and/or other online activities. In accordance with the guideline approved by the Senate in April 2015, the total hours of face-to-face teaching activities (such as classroom, lab and tutorial) of a blended learning course should be at least 50% of such activities as offered in ordinary in-class mode.
For this type of course, concurrence should be sought from the Center for Education Innovation.

(21) ***Pure Online Delivery***
For credit bearing online courses, undergraduate students are allowed to use at most 6 credits earned from these courses to count towards the graduation requirements, according to the policy approved by the Senate in June 2017.
For this type of course, concurrence should be sought from the Center for Education Innovation.

(22) ***Experiential Learning*** *(subject to the final wordings of definitions to be adopted in the UAA exercise)*
Experiential learning is a process which students are involved in the hands-on experiences and through which students can develop knowledge, skills, and attitudes. Learning considered "experiential" contains the following elements:
- Authentic and real-life experiences for students to engage intellectually, emotionally, socially, and/or physically
- Opportunities for students to pose questions, investigate, experiment, take initiative, make decisions, and be accountable for the results
- Reflective processes that lead to analysis, critical thinking, and synthesis
- A well-designed learning experience that allows students to learn from natural consequences, mistakes, and successes

For this type of course, concurrence should be sought from the Center for Education Innovation.