Annexe A: New/Revised Course Content in OBTL+ Format

Course Overview

The sections shown on this interface are based on the templates UG OBTL+ or PG OBTL+
If you are revising/duplicating an existing course and do not see the pre-filled contents you expect in the subsequent sections e.g. Course Aims, Intended Learning Outcomes etc. please refer to Data Transformation Status for more information.

Expected Implementation in Academic Year	AY2020-2021
Semester/Trimester/Others (specify approx. Start/End date)	Semester 1
Course Author * Faculty proposing/revising the course	Richard David Webster
Course Author Email	webster@ntu.edu.sg
Course Title	Chemistry & Biological Chemistry Laboratory 4
Course Code	CM3062
Academic Units	3
Contact Hours	54
Research Experience Components	Not Applicable

Course Requisites (if applicable)

Pre-requisites	CM2062
Co-requisites	
Pre-requisite to	
Mutually exclusive to	
Replacement course to	
Remarks (if any)	

Course Aims

The principle aims of the practical course are:

1. To complement and supplement the lecture courses of CM2011, CM2041, CM3011, CM3041 and CM4011 by providing experimental demonstrations and verifications of the points discussed therein.

2. To hone your practical experimental skills that are essential for chemists working in industry and academia.

3. To improve your problem solving ability.

4. To improve your scientific writing skills.

5. To extend your experience of the experimental techniques used by analytical chemists, (bio)physical chemists and (bio)spectroscopists.

6. To train you in the safe handling of chemicals and assessment of risks in experimental procedures.

Course's Intended Learning Outcomes (ILOs)

Upon the successful completion of this course, you (student) would be able to:

ILO 1	Work independently and, where required, in collaboration with other students to safely perform experiments from the laboratory manual.
ILO 2	Follow detailed instructions in the laboratory manual to obtain desired experimental results.
ILO 3	Operate state-of-the-art scientific laboratory equipment that is often used in industry.
ILO 4	Analyze the data from your experiments to fit a theoretical model.
ILO 5	Read scientific literature to gain a deeper understanding of your experimental results.
ILO 6	Work INDEPENDANTLY to prepare a detailed written report of your experimental findings.
ILO 7	Keep an accurate laboratory notebook of your experimental results in a form that is understandable by a third party.
ILO 8	Assess the potential risks of an experimental procedure before the procedure is carried out.
ILO 9	Review the experimental procedures after the experiments to see if there are more potential risks and propose how these can be alleviated.
ILO 10	Connect the experiments conducted with the relevant theories.

Course Content

S/N	Experiment	Approx. Laboratory Hours
1	Computational Chemistry: Gaussian	6
2	Gas Phase Infrared Molecular Spectroscopy	6
3	A Kinetic Study of the Enzyme Papain	6
4	Environmental Analysis Using ICP-OES	6
5	Experimental Cyclic Voltammetry	6
6	Ion Chromatography	6
7	Melting Temperatures of Duplex DNA	6
8	Determining the Enthalpy of Vaporization by Gas Chromatography	6
9	Synthesis and Characterization of Silver Nanoparticles using UV-vis Absorption Spectroscopy and Atomic Force Microscopy	6

Reading and References (if applicable)

Reading references are provided in the laboratory manual. You will also be required to use the on-line databases of the library to find new relevant reference materials in the scientific literature.

Planned Schedule

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
1	Computational Chemistry: Gaussian	1-10			Computer based exercise, Proforma provided
2	Gas Phase Infrared Molecular Spectroscopy	1-10			Laboratory experiment
3	A Kinetic Study of the Enzyme Papain	1-10			Laboratory experiment, Proforma provided
4	Environmental Analysis Using ICP-OES	1-10			Laboratory experiment, Proforma provided
5	Experimental Cyclic Voltammetry	1-10			Laboratory experiment, Proforma provided
6	Ion Chromatography	1-10			Laboratory experiment, Proforma provided
7	Melting Temperatures of Duplex DNA	1-10			Laboratory experiment, Proforma provided
8	Determining the Enthalpy of Vaporization by Gas Chromatography	1-10			Laboratory experiment

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
9	Synthesis and Characterization of Silver Nanoparticles using UV-vis Absorption Spectroscopy and Atomic Force Microscopy	1-10			Laboratory experiment

Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
A mixture of performing experiments, processing data and writing weekly reports.	The majority of the course is conducted in the laboratory where you will receive hands-on experience with the necessary equipment. The experiments will be conducted in a mixture of individually as well as part of a team, although you are expected to gain full knowledge of all parts of the experimental procedures. The reports for the experiments are expected to be done individually so that you have complete knowledge of all theoretical aspects of the experiments.

Assessment Structure

Assessment Components (includes both continuous and summative assessment)

No.	Component	ILO	Related PLO or Accreditation	Weightage	Team/Individual	Rubrics	Level of Understanding
1	Continuous Assessment (CA): Others(Experiment)	1-10	Competence, Communication and Creativity	50	Individual	Analytic	Multistructural
2	Summative Assessment (EXAM): Final exam(Final exam)	4,5,10	Competence, Communication and Creativity	50	Individual	Analytic	Multistructural

Description of Assessment Components (if applicable)

Formative Feedback

You will be given feedback in three ways:

1. A teaching assistant (TA) will be present for each individual experiment who will instruct you in the technical details and will be able to answer any pertinent questions regarding the experimental procedures.

2. The TAs will mark each experiment that you submit and return it the next week so that you can see how you are progressing.

3. Each experiment was written by an academic staff member who you are able to contact for a one-on-one discussion.

NTU Graduate Attributes/Competency Mapping

This course intends to develop the following graduate attributes and competencies (maximum 5 most relevant)

Attributes/Competency	Level
Creative Thinking	Intermediate
Decision Making	Intermediate
Learning Agility	Intermediate
Problem Solving	Intermediate
Transdisciplinarity	Intermediate

Course Policy

Policy (Academic Integrity)

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values. As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the academic integrity website for more information. On the use of technological tools (such as Generative AI tools), different courses / assignments have different intended learning outcomes. Students should refer to the specific assignment instructions on their use and requirements and/or consult your instructors on how you can use these tools to help your learning. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Policy (General)

Laboratory safety and punctuality:

The instructors and chief TA of this module take a very serious stance on laboratory safety, punctuality and academic integrity.

(i) Students who flaunt safety rules spelt out in the CM3062 laboratory manual will be barred from entering the laboratory.

(ii) The laboratory sessions begin promptly at 9.30 am. A significant amount of marks (up to 50%) will be deducted for students who are late for any of the laboratory sessions without a valid excuse. Students who arrive 20 minutes after the start of the lab session will not be allowed to enter the lab and will receive a grade of zero for that day's experiment.

(iii) Hand-in your lab reports/pro-formas in time. This is usually 1 week after you have completed the lab session unless you have been granted permission to delay submission by either an instructor or the chief TA. Lab reports/pro-formas submitted after the due date will not be accepted and students will receive a grade of zero for that experiment.

If you have a valid reason for missing a lab, you must submit the previous week's report to the lab before 10 am on the very next working day upon expiration of the MC.

Policy (Absenteeism)

If you are unable to attend any of the assigned lab sessions, you must, within 7 days after the lab, provide the original supporting document (e.g., medical certificate from a medical doctor, order for court appearance) to the SPMS office. In addition, you must email or present to the chief TA a copy of the supporting document within 2 days after your excuse has expired.

If you need to obtain a leave of absence for any of the labs, please lodge a formal application through the SPMS office. Only official approvals from the SPMS office are accepted by the instructors of this course.

Failure to do so will result in a zero grade for the lab that the student is absent from.

Please be reminded that students must complete at least 7 out of the 9 experiments in order to be allowed to sit for the final exam. There will NOT be any make-up laboratory experiments.

Policy (Others, if applicable)

Diversity and Inclusion Policy

Integrating a diverse set of experiences is important for a more comprehensive understanding of science and engineering.

It is our goal to create an inclusive and collaborative learning environment that supports a diversity of perspectives and learning experiences. That honours your identities; including ethnicity, gender, socioeconomic status, sexual orientation, religion or ability.

To help accomplish this:

- If you are neuroatypical or neurodiverse, have dyslexia or ADHD (for example), or have a social anxiety disorder or social phobia;
- If you feel your performance in the course is being impacted by your experiences outside of class;
- If something was said in the course (by anyone, including instructor/supervisor) that made you uncomfortable.

Please e-mail to your Associate Chair (Students & Continuing Education) at ac-cceb-stud@ntu.edu.sg about how we can help facilitate your learning experience.

As a participant in course discussions you should also strive to honour the diversity of your classmates. You can do this by; using preferred pronouns and names; being respectful of others opinions and actively making sure all voices are being heard; and refraining from the use of derogatory or demeaning speech or actions.

All members of the course are expected to strictly adhere to the student code of conduct (https://www.ntu.edu.sg/life-at-ntu/student-life/student-conduct) . If you witness something that goes against this or have any other concerns, please speak to your instructors or a faculty member.

Last Updated Date: 06-11-2024 09:17:08

Last Updated By: Erin Lee Ke Xin