# CHEM3084: FORENSIC IMAGING

**Effective Term**
Semester A 2024/25

## Part I Course Overview

**Course Title**
Forensic Imaging

**Subject Code**
CHEM - Chemistry
**Course Number**
3084

**Academic Unit**
Chemistry (CHEM)

**College/School**
College of Science (SI)

**Course Duration**
One Semester

**Credit Units**
3

**Level**
B1, B2, B3, B4 - Bachelor's Degree

**Medium of Instruction**
English

**Medium of Assessment**
English

**Prerequisites**
Nil

**Precursors**
Nil

**Equivalent Courses**
Nil

**Exclusive Courses**
Nil

## Part II Course Details

### Abstract

This course allows students to critically explore the use of forensic imaging in the investigation of crime, identification of mass fatality victims and the investigation of the cause of death. The aim of this course is to enable students to explore

more fully the use of forensic imaging. Students will be able to critically evaluate the use of the virtual autopsy, methods employed in the investigation of mass fatalities, the importance of diagnostic imaging in the investigation of crime and other fields in which imaging is used as an investigation tool.

**Course Intended Learning Outcomes (CILOs)**

|   | CILOs | Weighting (if app.) | DEC-A1 | DEC-A2 | DEC-A3 |
|---|-------|---------------------|--------|--------|--------|
| 1 | Evaluate the role of forensic imaging within current Hong Kong legislation. | 10 | | x | |
| 2 | Discuss professional, ethical, moral and legal frameworks that guide the practice of forensic imaging clinicians. | 10 | x | | |
| 3 | Identify and distinguish the components and management of the use of forensic imaging including various aspects of technical knowledge of diagnostic imaging modalities and practical tasks of scans for natural and forensic death investigation. | 30 | | | x |
| 4 | Recognise and conclude how to interpret, evaluate and apply theory of the concepts of the various areas of forensic imaging for natural and forensic death investigation including examination protocols, procedures, reporting basic findings and research skills. | 30 | | x | x |
| 5 | Critically review, debate and discuss literature on the role of forensic imaging in a variety of situations, making comparison to other techniques used in those areas. | 20 | | x | x |

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

**Learning and Teaching Activities (LTAs)**

| | LTAs | Brief Description | CILO No. | Hours/week (if applicable) |
|---|---|---|---|---|
| 1 | Lecture, interactive questioning and tutorials | Students will recognise the basic concepts and processes in forensic imaging and allow their practice in explaining these knowledge to peers, based on a combination of lectures, interactive questioning and tutorials. | 1, 2, 3, 4, 5 | |
| 2 | Lectures, interactive questioning and tutorial from experts in relevant fields | Students will recognise the range of forensic imaging applications that have facilitated death investigation in different circumstances, and will recognise the pitfalls in practical situations, based on a combination of lectures, interactive questioning and tutorial from experts in relevant fields of forensic science. | 1, 2, 3, 4, 5 | |
| 3 | Readings | Students will go through reading materials provided including reference books, journal, and press articles related to facilitate self-directed learning. | 1, 2, 3, 4, 5 | |
| 4 | Problem-solving activities, e.g. virtual reality simulation and interactive tutorials | Students will experience in critically investigations of the cause and manner of death, with the application of forensic imaging and related techniques, based on problem-solving activities, e.g. virtual reality simulation and interactive tutorials. Small-group analysis and practices will be arranged to students to assess students' grasp of knowledge taught in class. | 1, 2, 3, 4, 5 | |

**Assessment Tasks / Activities (ATs)**

| | ATs | CILO No. | Weighting (%) | Remarks (e.g. Parameter for GenAI use) |
|---|---|---|---|---|
| 1 | In-class tutorial assignments | 1, 2, 3, 4, 5 | 10 | |

| 2 | Short quizzes for problem-solving activities | 1, 2, 3, 4, 5 | 10 | |
| 3 | Individual analysis report | 1, 2, 3, 4, 5 | 20 | |
| 4 | Group presentation project | 1, 2, 3, 4 | 30 | |

**Continuous Assessment (%)**

70

**Examination (%)**

30

**Examination Duration (Hours)**

2

**Additional Information for ATs**

Starting from Semester A, 2015-16, students must satisfy the following minimum passing requirement for courses offered by CHEM: "A minimum of 40% in both coursework and examination components."

**Assessment Rubrics (AR)**

**Assessment Task**

1. In-class tutorial assignments

**Criterion**

1.1 Ability to examine the technical knowledge on forensic imaging and its applications with medicolegal and bioethical aspects for natural and forensic death investigation.

1.2 Ability to critically evaluate the applications of forensic imaging with medicolegal and bioethical aspects for natural and forensic death investigation.

1.3 Ability to work effectively in a team while influencing others to achieve results.

**Excellent (A+, A, A-)**

Excellent knowledge in forensic imaging and very enthusiastic participation in class discussion.

**Good (B+, B, B-)**

Significant knowledge in forensic imaging and active participation in class discussion.

**Fair (C+, C, C-)**

Moderate knowledge in forensic imaging and some participation in class discussion.

**Marginal (D)**

Basic knowledge in forensic imaging and inadequate participation in class discussion.

**Failure (F)**

Poor knowledge in forensic imaging and very limited participation in class discussion.

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**Assessment Task**

2. Short quizzes for problem-solving activities

**Criterion**

2.1 Ability to complete the problem-solving activities and demonstrate grasp of the important concepts to the topic concerned.

**Excellent (A+, A, A-)**

Complete the activities with excellent demonstration on grasp of the important concepts to topics concerned.

**Good (B+, B, B-)**

Complete the activities with significant demonstration on grasp of the important concepts to topics concerned.

**Fair (C+, C, C-)**

Complete the activities with moderate demonstration on grasp of the important concepts to topics concerned.

**Marginal (D)**

Complete the activities with marginal demonstration on grasp of the important concepts to topics concerned.

**Failure (F)**

Incompletion of the activities with poor demonstration on grasp of the important concepts to topics concerned.

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**Assessment Task**

3. Individual analysis report

**Criterion**

3.1 Capacity to value forensic imaging and its applications with medicolegal and bioethical aspects for natural and forensic death investigation.

3.2 Ability to examine the technical knowledge on forensic imaging and its applications with medicolegal and bioethical aspects for natural and forensic death investigation.

3.3 the applications of forensic imaging with medicolegal and bioethical aspects for natural and forensic death investigation.

**Excellent (A+, A, A-)**

Excellent analytic skills to examine the knowledge to demonstrate in-depth understanding of the applications of forensic imaging.

**Good (B+, B, B-)**

Significant analytic skills to examine the knowledge to demonstrate good understanding of the applications of forensic imaging.

**Fair (C+, C, C-)**

Moderate analytic skills to examine the knowledge to demonstrate adequate understanding of the applications of forensic imaging.

**Marginal (D)**

Basic analytic skills to examine the knowledge to demonstrate some understanding of the applications of forensic imaging.

**Failure (F)**

Poor analytic skills to examine the knowledge and is barely able to demonstrate an understanding of the applications of forensic imaging.

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**Assessment Task**

4. Group presentation project

**Criterion**
4.1 Ability to develop plans to apply forensic imaging techniques in accident and non-accident injury and death investigation.

4.2 Ability to work effectively in a team while influencing others to achieve results.

**Excellent (A+, A, A-)**
Excellent presentation skills to demonstrate in-depth applications of forensic imaging techniques as a great team work.

**Good (B+, B, B-)**
Significant presentation skills to demonstrate good applications of forensic imaging techniques as a good team work.

**Fair (C+, C, C-)**
Moderate presentation skills to demonstrate adequate applications of forensic imaging techniques as some team work.

**Marginal (D)**
Basic presentation skills to demonstrate some applications of forensic imaging techniques with inadequate team work.

**Failure (F)**
Poor presentation skills to demonstrate applications of forensic imaging techniques with very limited team work.

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**Assessment Task**
5. Written examination

**Criterion**
5.1 Ability to examine the technical knowledge on forensic imaging and its applications with medicolegal and bioethical aspects for natural and forensic death investigation.

5.2 Ability to critically evaluate the applications of forensic imaging with medicolegal and bioethical aspects for natural and forensic death investigation.

**Excellent (A+, A, A-)**
Excellent knowledge in forensic imaging and result in examination.

**Good (B+, B, B-)**
Significant knowledge in forensic imaging and result in examination.

**Fair (C+, C, C-)**
Moderate knowledge in forensic imaging and result in examination.

**Marginal (D)**
Basic knowledge in forensic imaging and result in examination.

**Failure (F)**
Poor knowledge in forensic imaging and result in examination.

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# Part III Other Information

### Keyword Syllabus

Forensic imaging, medicolegal issues, crime scene investigation, diagnostic imaging modalities, virtopsy, 3D surface scanning, legal evidence, cause of death, corpse, witness, radiation protection, injury-inflicting instrument

### Reading List

### Compulsory Readings

|   | Title |
|---|-------|
| 1 | Michael J. Thali, Mark D. Viner, B.G. Brogdon (2011). Brogdon's Forensic Radiology. |
| 2 | Lo Re G, Argo A, Midiri M, Cattaneo C (2020). Radiology in Forensic Medicine: from Identification to Post-mortem Imaging. |
| 3 | Michael J. Thali, Richard Dirnhofer, Peter Vock (2009). The Virtopsy Approach: 3D Optical and Radiological Scanning and Reconstruction in Forensic Medicine. |
| 4 | Silke Grabherr, Jochen M. Grimm, Axel Heinemann (2016). Atlas of Postmortem Angiography. |
| 5 | Guy Rutty, Bruno Morgan. (2016) Cross Sectional Imaging and the Post-mortem Interval. In: Madea B (ed.). Estimation of the Time Since Death (3rd edition). London, UK: CRC Press. |
| 6 | Ian S.D. Roberts ISD, Zoe C. Traill. (2016). The Radiological Autopsy. In: Survana SK (ed.). Atlas of Autopsy – A Guide to Modern Practice. London, UK: Springer. |
| 7 | Michael J. Thali, Kathrin Yen, Wolf Schweitzer, Peter Vock, Chris Boesch, Christoph Ozdoba, Gerhard Schroth, et al. (2003). Virtopsy, A New Imaging Horizon in Forensic Pathology: Virtual Autopsy by Postmortem Multislice Computed Tomography (MSCT) and Magnetic Resonance Imaging (MRI)-a Feasibility Study. Journal of Forensic Sciences 48: 386-403. (journal) |
| 8 | Andreas Christe, Patricia Flach, Steffen Ross, Danny Spendlove, Stephan Bolliger, Peter Vock, Michael J. Thali. (2010). Clinical Radiology and Postmortem Imaging (Virtopsy) Are Not The Same: Specific and Unspecific Postmortem Signs. Legal Medicine 12: 215-222. (journal) |
| 9 | Lars C. Ebert, Wolfgang Ptacek, Robert Breitbeck, Martin Fürst, Gernot Kronreif, Rosa M. Martinez, Michael J. Thali, et al. (2014). Virtobot 2.0: the Future of Automated Surface Documentation and CT-guided Needle Placement in Forensic Medicine. Forensic Science, Medicine and Pathology 10:179-186. (journal) |
| 10 | Guy N. Rutty, Bruno Morgan, Tanja Germerott, Michael J. Thali, Owen Arthurs. (2016). Ventilated Post-mortem Computed Tomography – A Historical Review. Journal of Forensic Radiology and Imaging 4:35–42. (journal) |

### Additional Readings

|   | Title |
|---|-------|
| 1 | Brian C.W. Kot, Henry C.L. Tsui, Tabris Y.T. Chung, Amy P.Y. Lau. (2020). Postmortem Neuroimaging of Cetacean Brains Using Computed Tomography and Magnetic Resonance Imaging. Frontiers in Marine Science 7:544037. (journal) |
| 2 | Henry C.L. Tsui, Brian C.W. Kot, Tabris Y.T. Chung, Derek K.P. Chan. (2020). Virtopsy as a Revolutionary Tool for Cetacean Stranding Programs: Implementation and Management. Frontiers in Marine Science 7:542015. (journal) |
| 3 | Brian C.W. Kot, Tabris Y.T. Chung, Derek K.P. Chan, Henry C.L. Tsui. Image Rendering Techniques in Postmortem Computed Tomography: Evaluation of Biological Health and Profile in Stranded Cetaceans. Journal of Visualized Experiments 163:e61701. (journal) |
| 4 | Brian C.W. Kot, Henry C.L. Tsui, Tabris Y.T. Chung, W.W. Cheng, Thomas Mui, L.Y. Lo, K. Mori, Tadasu K. Yamada, Richard A.L. Brown. (2020). Photogrammetric Three-dimensional Modeling and Printing of Cetacean Skeleton using an Omura's Whale Stranded in Hong Kong Waters as an Example. Journal of Visualized Experiments 163:e61700. (journal) |