Above top row: UC66076 (PMEA) and FTIR spectra from sampled adhesives
Above bottom row: X-ray of Egyptian painted wooden boat; SEM image of layered paint sample from Chinese dance mask, UV image of Ecuadoran painting with sample sites identified
UCL INSTITUTE OF ARCHAEOLOGY

ARCL0106: Conservation Materials Science

2018-19

MSc Module
30 credits
Turnitin Class ID: 3885905
Turnitin Password: IoA1819

Deadlines for coursework for this module:
SEM/SEM-EDS sample report – 28 November 2018
Analytical proposal – 17 December 2018
Analytical report – 8 April 2019
Submission of analytical samples/analyses/report materials – 15 April 2019

Target dates for return of marked coursework to students:
SEM/SEM-EDS sample report – 17 December 2018
Analytical proposal – 16 January 2019
Analytical report – 29 April 2018
Submission of analytical samples/analyses/report materials – 29 April 2018

Co-ordinator: Dr. Caitlin R. O’Grady
caitlin.r.ogrady@ucl.ac.uk
IoA Rm. 203 / 02076797487 / internal 257487
Office hours: Thursdays 13:00 – 14:30 or via appointment

Post-graduate teaching assistant: Ole F. Nordland
ole.nordland.14@ucl.ac.uk
IoA Rm. B53

Please see the last page of this document for important information about submission and marking procedures, or links to the relevant webpages.
1 OVERVIEW

ARCL0106 SHORT DESCRIPTION
This module provides students with an understanding of material chemistry, properties, and structure through the lens of culture. Preindustrial material technologies, their deterioration processes, and relationship to observed condition of objects are the focus. Students gain first-hand experience critically reviewing literature, as well as using and interpreting examination methods and analytical techniques in the analysis of cultural materials. This is facilitated by access to the equipment and facilities in the Institute’s Wolfson laboratories (optical microscopy, X-radiography, scanning electron microscopy, electron microprobe, Fourier-transform infrared spectroscopy and X-ray diffraction).

ARCL0106 WEEK-BY-WEEK SUMMARY
Term 1
Week 1 – 1 October 2018
9:30 – 13:00
Introduction to the module
Introduction to materials and their structure; analytical methodologies and data
CRO

14:00 – 17:00
Discussion of research projects, data collection and interpretation
CRO

Week 2 – 8 October 2018
9:30 – 13:00
Instrumental overview: spot testing and optical microscopy
Discussion articles (CRO to lead discussion)
CRO

14:00 – 17:00
Visit to PMEA to learn about research objects (PMEA: 14:00 – 15:00)
Visit with Ian Carroll to learn about research objects (PMEA 615 – 15:15 – 16:15)
CRO, AG
CRO, IC

Week 2 – 10 October 2018 (CONT.) [please note this is a Tuesday and start time 10:00]
Ceramic technology: chemistry and degradation
BS

Week 3 – 15 October 2018
9:30 – 13:00
Artefact sampling / Adhesion
Discussion articles (student-led)
Practical session: Sampling – removal and preparation / adhesive reference tile
CRO, OFN

14:00 – 17:00
Practical session (cont): Sampling – removal and preparation / adhesive reference tile
Work with assigned artefacts
CRO, OFN

Week 4 – 22 October 2018
9:30 – 13:00
Instrumental Overview: SEM and pXRF
Discussion articles (student-led)
CRO

Key to initials: AG= Anna Garrett, BS= Bill Sillar, CRO= Caitlin O’Grady, IC= Ian Carroll, OFN= Ole F. Nordland
Week 4 – 22 October 2018 (CONT.)
14:00 – 17:00
SEM/SEM-EDS orientation (rm. B4: 14:00 – 15:00 group 1) TG
SEM/SEM-EDS orientation (rm. B4: 15:00 – 16:00 group 2) TG

Week 5 – 29 October 2018
9:30 – 13:00
Stone CRO
Developing PhD research OFN
Discussion articles (student-led)

14:00 – 17:00
Work with assigned artefacts CRO

READING WEEK: 5– 9 November 2018 (No Teaching)

Week 6 – 12 November 2018 (please note start time 10:00)
9:30 – 13:00
Glass, glazes and faience: chemistry and deterioration VS
Discussion articles (student-led)

14:00 – 17:00
Work with assigned artefacts CRO

Week 6 – 12 – 16 November 2018 (CONT.)
COMPULSARY SEM training and analysis sessions (rm. B4)
12 November – 13:00-17.00 (2 students) CRO
13 November – 13:00-17.00 (2 students) CRO, TG/OFN
15 November – 9:00-11.00 (1 student) TG, OFN
13:30-15:30 (1 student) TG, OFN
16 November – 9:00-17.00 (4 students) TG, OFN

Week 7 – 19 November 2018 (please note start time 10:00)
10:00 – 13:00
Pigment ID RS
Discussion articles (student-led)

14:00 – 17:00
Work with assigned artefacts CRO

Week 8 – 26 November 2018 (please note start time 10:00)
10:00 – 13:00
Gypsum, lime mortar and hydraulic cements RS
Discussion articles (student-led)

Key to initials: CRO= Caitlin O’Grady, OFN= Ole F. Nordland, RS= Ruth Siddall, TG= Tom Gregory, VS= Victoria Sainsbury
Week 8 – 26 November 2018 (CONT.)
14:00 – 17:00
Work with assigned artefacts

***28 November 2018 – SEM/SEM-EDS analysis report submitted to Turnitin/CRO email by 23:59 GMT***

Week 9 – 3 December 2018
9:30 – 13:00
Overview: XRD, FTIR and Raman
Discussion articles (student-led)

14:00 – 17:00
Work with assigned artefacts

Week 9 – 3 December 2018 (CONT.)
COMPULSARY FTIR training and analysis sessions (rm. B4)
3 December 2018 – 13:00 – 17:00 pm (3 students)
4 December 2018 – 14:00 – 17:00 (2 students)
7 December 2018 – 9.00 – 16.00 (5 students)

Week 10 – 10 December 2018
Copper and copper alloys
14:00 – 17:00
Work with assigned artefacts

***10 December 2018 – FTIR analysis of reference adhesive submitted to CRO by 17:00 GMT***

***14 December 2018 – discussion article for week 12 submitted to CRO by 17:00 GMT***

***17 December 2018 – analytical proposal submitted to Turnitin/CRO email by 23:59 GMT***

TERM 2 2019 **Please note that some term 2 sessions are not yet confirmed.**

Week 11 – 7 January 2019
9:30 – 13:00
Iron working: technology and corrosion
Discussion articles (student-led)

Week 12 – 14 January 2019
9:30 – 13:00
Analytical projects and presentation of data
Discussion articles (CRO to lead discussion)

Week 13 – 21 January 2019
9:30 – 13:00
Wood structure and ID
Practical session

Key to initials: CRO = Caitlin O’Grady, MC = Michael Charlton, MR = Miljana Radivojevic, OFN = Ole F. Nordland, PA = Phillip Austin
Week 14 – 28 January 2019
No scheduled lecture

Week 14 – 29 January 2019 [please note this is a Tuesday and the session start time is 10:30]
10:30 – 13.00
Plastics chemistry, properties and technology
ER

Week 15 – 4 February 2019
9:30 – 13:00
Wood technology
GM
Wood deterioration
DS
Discussion articles (student-led)

READING WEEK: 11 – 15 February 2019 (No Teaching)

Week 16 – 18 February 2019
9:30 – 13:00
Plant and animal fibres
CC
Demo/practical: fibre identification
SB (TBC)

Week 17 – 25 February 2019
No scheduled lecture

Week 17 – 1 March 2019 [please note this is a Friday session]
9:30 – 13:00
Paper
MS

Week 18 – 4 March 2019
9:30 – 13:00
Leather, skin and parchment: technology and processing and deterioration
DS
Leather practical class: leather ID
Discussion articles (student-led)

Week 19 – 11 March 2019 [please note the start time 10:00]
10:00 – 13:00
Textile technology, examination
MG
Discussion articles (student-led)

Week 20 – 18 March 2019 – TBC
10:00 – 13:00
Animal hard tissues 1: bone, teeth, ivory, horn, antler, shell
DA (TBC)
Demo/practical: identifying hard tissue materials in objects
DA (TBC)

***8 April 2019 – analytical report submitted to Turnitin/CRO email by 23:59 GMT***

***15 April 2019 – analytical data, documents, and samples submitted to CRO by 17:00 GMT***

Key to initials: CC= Caroline Cartwright, DA= Daniel Antoine, DS= Dean Sully, ER=Emma Richardson, GM=Gustav Milne, MG=Margarita Gleba, MS= Matija Strlic, SB= Sandra Bond
**Basic texts**
The following books and websites will give you a good introduction and knowledge of materials chemistry, properties and degradation.

- e-Book available online through UCL library
- ISSUE DESK IOA ART 1

- INST ARCH JDA HEN

- e-Book available online through UCL library
- INST ARCH JD Qto JON

- e-book available online through UCL library
- INST ARCH AJ MAR

- INST ARCH LA MAY


- e-Book available online through UCL library
- INST ARCH JDD POL

- INST ARCH JD POL

- e-Book available online through UCL library
- INST ARCH AJ PRI


The following journals and conference proceedings publish relevant case studies:
Journal of the American institute for conservation [http://cool.conservation-us.org/jaic/]
Journal of archaeological science
[http://www.journals.elsevier.com/journal-of-archaeological-science/]
Archaeological and anthropological sciences [http://link.springer.com/journal/12520]
Journal of cultural heritage [http://www.journals.elsevier.com/journal-of-cultural-heritage/]
Conservation and management of archaeological sites [http://www.maneyonline.com/loi/cma]

ICOM-CC triennial meetings
ICOM-CC metal conferences, e.g. Metal 04, Metal 07, Metal 10, Metal 13, Metal 16
International symposium on archaeometry
Materials issues in art and archaeology (Materials Research Society)

Other useful resources and case studies available online or through the UCL Library system:
AATA Online: Abstracts of International Conservation Literature [http://aata.getty.edu/Home]
BCIN: Bibliographic Database of the Conservation Information Network
[http://www.bcin.ca/English/home_english.html]
CAMEO – Boston Museum of Fine Arts [http://cameo.mfa.org/wiki/Main_Page]
Internet Archive [https://archive.org/]
Science Direct [http://www.sciencedirect.com/]
Web of Science/Web of Knowledge
[http://apps.webofknowledge.com/WOS_GeneralSearch_input.do?product=WOS&search_mode=GeneralSearch&SID=V1SbkM9VV8i7n4UZok&preferences Saved=

**Methods of Assessment**

This module is assessed by two pieces of written assessment totaling 7000 words. These include:

a. (i) SEM/SEM-EDS sample report and (ii) research proposal – 3000 words (40% of module mark)
b. report summarizing analytical results/interpretation addressed in research proposal – 4000 words (60% of module mark)

The topics and deadlines for each assessment are discussed in the following sections. If students are unclear about the nature of an assignment, they should contact the Module Co-ordinator is willing to discuss any questions, provided this is planned suitably in advance of submission date.

**Teaching Methods**
The module is taught over Term 1 and Term 2 of the 2018 – 2019 academic year and includes weekly lectures, demonstrations and practical classes (all are compulsory).

**Discussion Articles**
Each student will be responsible for leading discussion of selected readings during one lecture in term 1. Student leaders SHOULD CRITICALLY ASSESS the success or failure of the selected reading based on writing, format, data presentation, figures/tables, etc. Discussion SHOULD NOT SUMMARIZE reading content and leaders should engage others in the class to make critical statements of the articles under discussion. Readings will be assigned during the first class meeting on 1 October 2018.

**Week 12 discussion articles**
Each student must submit an article for discussion during week 12 lecture on Analytical projects and presentation of data that is relevant for their research report on or before 14 December 2018. All submitted
articles will form the foundation of discussion during lecture. Each student is expected to read all articles submitted for lecture 12.

Where required, additional small group sessions are arranged to give students greater familiarity with some of the techniques covered in the module. Teaching will take place on Mondays in the conservation laboratory (IoA room 615), while practical sessions are held in the conservation laboratories or in the appropriate basement lab.

Owing to the wide variety of techniques taught during the module, practical sessions may be scheduled at different times each week and in various locations depending on the subject taught, therefore it is important that you check your timetable at the beginning of each week. However, UNLESS otherwise indicated, all module events are scheduled to occur in IoA room 615.

Research Artefacts
As part of their assessed coursework, students will analyze ceramic artefacts located in the collections of the Petrie Museum of Egyptian Archaeology (PMEA) and the Institute of Archaeology (IoA). Access to these objects is limited to Monday afternoons in the IoA conservation laboratory. Occasionally, students will have access to these objects outside of these parameters. Limited access to objects under study is standard practice for the majority of guest researchers working in collections and institutions where they are not employed including museums, archives and educational institutions.

During Monday afternoons, students will have access to assigned artefacts for examination and study. During these sessions, digital Dino-lite Pro cameras (microscope, UV, IR) and a computer will be available in order to document their object and to collect data.

Object sessions
Students will be introduced to PMEA and IoA collections on 8 October 2018 between 14:00 – 16:00, as well as assigned objects. The PMEA and its staff (Anna Garnett, curator, PMEA) have kindly loaned objects to the IoA and which will be analysed in tandem with ceramics from objects in the IoA collections. Both PMEA and IoA collection objects will be available for students on Monday afternoons (14:00 – 17:00) for inspection, documentation, sampling, etc. For access outside of Monday afternoons, students must schedule alternative times directly with the module instructor. Please note that availability is at the discretion and schedule of the module instructor.

Photography
Students will be expected to digitally document their assigned research artefacts in visible and ultraviolet light conditions, as well as in detail using IoA resources including the IoA photography laboratory (overall images) and the Dino-lite Pro (visible, UV and IR light sources) (detailed images). This may be conducted as part of your Monday afternoon sessions. For access outside of Monday afternoons, students must schedule alternative times directly with the module instructor or PGTA as necessary. Please note that availability is at the discretion and schedule of the module instructor.

Sampling
While students are expected to sample assigned artefacts as part of module assessments, all sampling of conservation materials from PMEA and IoA artefacts must be approved by the module instructor in consultation with Anna Garnett or Ian Carroll (collections manager – UCL IoA). Students may only remove samples in the presence of the module instructor, the module PGTA, Anna Garnett and/or Ian Carroll.

If students propose to remove original material from an artefact (e.g. ceramic paste, pigment, or, other original component) for analysis, they must complete a destructive analysis request form as provided by the PMEA or IoA. Please note that all requests for destructive sampling – whether they come from UCL
postgraduate students, UCL faculty or external researchers – may take up to 4-6 weeks to process and are approved based on research merit on a case-by-case basis. Destructive sampling forms are available on the Moodle module website.

**Analytical Sessions**

Analytical sessions will be available to students two days a week during terms 1 and 2. These sessions allow students to work one-on-one with the module instructor or PGTA and will begin after Reading Week in term 1 on **12 November 2018**. **These afternoon sessions are still to be scheduled.** Students will be able to sign up for these sessions via the Moodle module website. Students may only sign up for sessions **2 weeks in advance**. This ensures that there is equitable distribution of sessions amongst students, as well as the availability of necessary (or special) instrumentation and equipment. Please take note of session availability on the Moodle module website.

Students should use analytical sessions to do any of the following:

1. discuss analytical proposals/research projects
2. collect and prepare samples for proposals/projects
3. gain experience operating various instruments [subject to instrument availability]
4. collect analytical data [subject to instrument availability]

It is extremely important that students collect data for their analytical projects throughout terms 1 and 2. Students should arrange with the module co-ordinator and PGTA to collect the majority of their samples by the end of term 1.

With the module co-ordinator or PGTA, students can collect empirical data or analytical data using instrumentation – including any of the following methods:

1. inspection of assigned object/materials under magnification
2. inspection of assigned object/materials under raking, ultraviolet and infrared light sources
3. solvent solubility of assigned object/materials
4. micro-chemical spot-testing
5. pXRF analysis of assigned object/materials
6. polarized/reflected light microscopy
7. SEM/SEM-EDS/FTIR/XRD analysis

Students must be prepared before any analytical session they have scheduled. This means:

1. object/samples/materials and microscope must be set up and available
2. tools, solvents and chemicals should be selected and available
3. pXRF/SEM/SEM-EDS/FTIR/XRD instrumentation needs to be available
4. reference images, spectra or diffractogram must be identified and printed to use for comparison during data collection

**SEM/SEM-EDS**

Term 1- SEM access for the MSc Year 1 students will be restricted to a training and data collection sessions scheduled for the week of 12 – 16 November 2018. Students will be trained on the SEM-EDS by the module co-ordinator, Ole F. Nordland, or Dr. Tom Gregory (SEM Lab Manager). Students will use samples prepared prior to Reading Week during their training session on the SEM. Please ensure that these samples are prepared and coated prior to the selected training session. Training sessions will last two-hours and each student will use the collected data as part of their assessed coursework for the module.
Term 2 – If additional time (as determined by the module instructor) is needed to collect data using the SEM/SEM-EDS instrumentation, this will be scheduled during the beginning of term 2.

**FTIR**

Term 1 - FTIR access for the MSc Year 1 students will be restricted to a training and data collection session scheduled for the week of 3 – 7 December 2018. Students will be trained on the FTIR by the module co-ordinator, or, Ole F. Nordland (module PGTA). Students will use adhesive reference samples prepared prior to their training session. Students are expected to bring the following during their training session:

- (a) sample of reference adhesive film
- (b) solvent (select solvent in which the reference adhesive is soluble), tweezers and scalpel
- (c) printed copy of published (web, digital, or paper publication) FTIR spectrum of selected reference adhesive

Students must submit an annotated FTIR spectrum of their selected reference adhesive that they collected for review by 10 December 2018. Annotations to include: peak values and their corresponding bond vibrations. This exercise is designed to help students develop their ability to analyse and interpret FTIR spectra.

Term 2 – Students will continue to use the FTIR throughout term 2 and should schedule analytical session time to operate the instrument with the module co-ordinator and/or PGTA.

Please note that the last day of access to instrumentation (in particular FTIR, PLM, SEM, XRD and XRF) will be 22 February 2019. This is to ensure that students plan their analysis appropriately, while having adequate time to analyze/interpret data and write their research report.

**Workload**

There will be 300 hours for this module and is divided in the following way:

- Lectures: 40 hours
- Demonstration/practical: 20 hours
- Reading + acting as article discussion leader during 1 class meeting: 120 hours
- Preparation and production of assessed work: 120 hours

**Prerequisites**

The module is introductory and will assume no previous knowledge of the subject. Lectures will contain technical and scientific content. As such, a basic knowledge of physics and chemistry would be an advantage. However, the module should be comprehensible to students of any background.

2 **AIMS, OBJECTIVES AND ASSESSMENT**

**Aims**

This module is designed to familiarize the student with the properties, technology and decay mechanisms of pre-industrial materials and to provide them with an understanding of the analytical techniques used in identifying, characterizing and assessing their condition. As well, module lectures, labs, practical sessions and assessments will give the student an increased awareness of the important information an object can yield with analysis and technological study.
**Objectives**
On successful completion of this module, students should:

- be familiar with the technologies involved in producing traditional artefacts and be able to interpret decayed material with a view to understanding an object’s original state
- have an overview of a wide range of analytical techniques for the study of artefacts and be able to choose the most appropriate method of analysis for a particular situation
- be able to carry out the following analytical procedures: SEM/SEM-EDS, XRF, FTIR, optical microscopy
- be aware of information scientists and specialist scholars collect through analysis of cultural heritage materials

**Learning Outcomes**
On successful completion of the module, students should be able to demonstrate/have developed:

- ability to read and critically evaluate scientific reports and papers with reference to the appropriateness of the techniques employed and the presented data
- the application of the knowledge acquired to the broader field of conservation practice to ensure that interventive procedures protect and reveal the information an artefact carries, so that information is not destroyed or obscured
- ability to communicate and collaborate with scientists and other specialists on analytical projects related to cultural heritage artefacts
- ability to propose relevant research and produce a report containing scientific data appropriately presented and interpreted

**Coursework**
**Item 1 [3000 words total] -** The first item of coursework is divided into **two components** including: (a) **SEM/SEM-EDS analytical summary** (250 words), and, (b) **research proposal** (2750 words). This piece of coursework is 40% of your final mark for ARCL0106. Students should allocate a nominal 48 hours of work to complete it in entirety — in addition to the time spent during class lectures, demonstrations/practicals/reading, etc. Students will propose research associated with an assigned object(s) in the PMEA and IoA collections using available instrumental equipment in the IoA. When developing your research proposal, ensure that your research question or problem may be answered by undertaking limited analytical investigation and instrumentation available at the IoA.

(a) **SEM/SEM-EDS analytical summary** [to be submitted by 23:59 GMT on Wednesday 28 November 2018]

- description of sample including image of sample and its original location on artefact
- description of instrumental parameters including settings used to collect data
- SEM/SEM-EDS data collected (secondary electron/backscatter electron image, and/or energy dispersive spectrum) with brief discussion of observed features in images or elemental data

The use of images, tables, diagrams are encouraged for this assignment. Additional guidelines regarding the report format will be made available in future class sessions.

***Please see Appendix B of this handbook for analytical report assessment criteria.***
The completed SEM/SEM-EDS analytical summary is due no later than **23:59 GMT on Wednesday 28 November 2018**. Please submit an electronic version to caitlin.r.ogrady@ucl.ac.uk with high resolution images in addition to that submitted to Turnitin and the paper copy.

Please note that students will receive their marked SEM/SEM-EDS analytical summary no later than **Monday 17 December 2018**.

**(b) Research proposal format** **(to be submitted by 23:59 GMT on Monday 17 December 2018):**

- lays foundation for research report submitted in term 2
- description of question and/or object that will be investigated; discuss why this research is important
- literature review of relevant publications that relate to your question
- proposed analytical work needed to answer research question
- any preliminary work you may have conducted (visual examination under visible/infrared/ ultraviolet illumination, solvent and micro-chemical spot-tests, etc.) that informs your proposed research

The use of images, tables, diagrams are encouraged for this assignment. Additional guidelines regarding the report format will be made available in future class sessions.

***Please see Appendix B of this handbook for analytical report assessment criteria.***

Students are **HIGHLY ENCOURAGED** to submit a draft of the research proposal via email to caitlin.r.ogrady@ucl.ac.uk by **17:00 GMT on Friday 23 November 2018** for review by the module co-ordinator.

The completed research proposal is due no later than **23:59 GMT on Monday 17 December 2018**. Please submit an electronic version to caitlin.r.ogrady@ucl.ac.uk with high resolution images in addition to that submitted to Turnitin and the paper copy.

Please note that students will receive their marked research proposal no later than **Wednesday 16 January 2019**.

**Item 2 [4000 words] (to be submitted by 23:59 GMT on Monday 8 April 2019)** - The second item of coursework is a short analytical report that comprises the remaining 60% of marks for this module. Students should take a nominal 72 hours to complete the research/analysis/practical work/writing required for this report.

The analytical report will build on the previously submitted research proposal. This assessment is designed to help you develop (or further develop) an area of analytical expertise by investigating a specific type of material or problem utilizing a method of analysis available at the IoA.

The use of images, tables, diagrams are encouraged for this assignment. Additional guidelines regarding the report format will be discussed in future class sessions.

***Please see Appendix B of this handbook for analytical report assessment criteria.***

Students are **HIGHLY ENCOURAGED** to submit a draft of the research report via email to caitlin.r.ogrady@ucl.ac.uk by **17:00 GMT on Friday 8 March 2019** for review.
The completed project should be handed in no later than 23:59 GMT on Monday 8 April 2019. Please submit an electronic version to caitlin.r.ogrady@ucl.ac.uk with high resolution images in addition to that submitted to Turnitin and the paper copy.

Please note that students will receive their marked research report no later than Monday 29 April 2019.

Students will be required to submit both paper and electronic versions of their research project report to the Petrie Museum of Egyptian Archaeology (Anna Garnett) and the Institute of Archaeology (Ian Carroll) – along with digital copies of relevant images and analytical data. This includes a summary table that describes each sample, types of analysis conducted, and results. This is standard practice when conducting research on museum collections. Additional guidelines regarding the format and naming of digital files and samples will be made available in future class sessions.

Samples, research reports and analytical data including physical and digital copies must be submitted to the module co-ordinator no later than 17:00 GMT on Monday 15 April 2019.

If students are unclear about the nature of an assignment, they should discuss this with the Module Co-ordinator. Students are not permitted to re-write and re-submit essays in order to try to improve their marks. However, the module co-ordinator is willing to review rough drafts of student's approach to the Analytical Proposal and Analytical Report assignments (only), provided this is submitted by the requested date.

Please note that in order to be deemed to have completed and passed in any module, it is necessary to submit all assessments.

Word Counts
The following should not be included in the word-count: title page, contents pages, lists of figure and tables, abstract, preface, acknowledgements, bibliography, lists of references, captions and contents of tables and figures, appendices.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>4,000</td>
<td>3,800-4,200</td>
</tr>
<tr>
<td>3,000</td>
<td>2,850-3,150</td>
</tr>
</tbody>
</table>

Penalties will only be imposed if you exceed the upper figure in the range. There is no penalty for using fewer words than the lower figure in the range: the lower figure is simply for your guidance to indicate the sort of length that is expected.

In the 2018-19 session penalties for overlength work will be as follows:

- For work that exceeds the specified maximum length by less than 10% the mark will be reduced by five percentage marks, but the penalised mark will not be reduced below the pass mark, assuming the work merited a Pass.
- For work that exceeds the specified maximum length by 10% or more the mark will be reduced by ten percentage marks, but the penalised mark will not be reduced below the pass mark, assuming the work merited a Pass.
Coursework submission procedures

- All coursework must normally be submitted both as hard copy and electronically. (The only exceptions are bulky portfolios and lab books which are normally submitted as hard copy only.)
- You should staple the appropriate colour-coded IoA coversheet (available in the IoA library and outside room 411a) to the front of each piece of work and submit it to the red box at the Reception Desk (or room 411a in the case of Year 1 undergraduate work).
- All coursework should be uploaded to Turnitin by midnight on the day of the deadline. This will date-stamp your work. It is essential to upload all parts of your work as this is sometimes the version that will be marked.
- Instructions are given below:

Note that Turnitin uses the term ‘class’ for what we normally call a ‘module’.

1. Ensure that your essay or other item of coursework has been saved as a Word doc., docx. or PDF document, and that you have the Class ID for the module (available from the module handbook) and enrolment password (this is **IoA1819** for all modules this session - note that this is capital letter I, lower case letter o, upper case A, followed by the current academic year)
3. Click on ‘Create account’
4. Select your category as ‘Student’
5. Create an account using your UCL email address. Note that you will be asked to specify a new password for your account - do not use your UCL password or the enrolment password, but invent one of your own (Turnitin will permanently associate this with your account, so you will not have to change it every 6 months, unlike your UCL password). In addition, you will be asked for a “Class ID” and a “Class enrolment password” (see point 1 above).
6. Once you have created an account you can just log in at [http://www.turnitinuk.com/en_gb/login](http://www.turnitinuk.com/en_gb/login) and enrol for your other classes without going through the new user process again. Simply click on ‘Enrol in a class’. Make sure you have all the relevant “class IDs” at hand.
7. Click on the module to which you wish to submit your work.
8. Click on the correct assignment (e.g. Essay 1).
9. Double-check that you are in the correct module and assignment and then click ‘Submit’
10. Attach document as a “Single file upload”
11. Enter your name (the examiner will not be able to see this)
12. Fill in the “Submission title” field with the right details: **It is essential that the first word in the title is your examination candidate number** (e.g. YGBR8 In what sense can culture be said to evolve?),
13. Click “Upload”. When the upload is finished, you will be able to see a text-only version of your submission.
14. Click on “Submit”.

If you have problems, please email the IoA Turnitin Advisors on ioa-turnitin@ucl.ac.uk, explaining the nature of the problem and the exact module and assignment involved.

One of the Turnitin Advisors will normally respond within 24 hours, Monday-Friday during term. Please be sure to email the Turnitin Advisers if technical problems prevent you from uploading work in time to meet a submission deadline - even if you do not obtain an immediate response from one of the Advisors they will be able to notify the relevant module co-ordinator that you had attempted to submit the work before the deadline.
3. **SCHEDULE AND SYLLABUS**

**Teaching schedule**
Lectures and demonstrations/practical sessions will be held from 9:00 – 13:00 on Mondays in room 615. Students will also be expected to utilize Monday afternoons from 14:00 – 17:00 pm to study, collect samples and assess their assigned objects. Lectures will be followed by a practical session or discussion, where one student will be responsible for leading discussion of assigned reading. Please note that some lectures will occur on days other than Monday – when necessary to accommodate guest lecturer schedules. When this occurs, please know that there will be no overlap with other required MSc coursework.

Finally, students must use available analytical sessions to develop, execute and interpret data necessary for their research project (sampling, analysis, interpretation, etc.). These one-on-one with the module co-ordinator and/or module PGTA are designed to facilitate student learning and progress.

Please note that some lectures are subject to finalisation of arrangements and discussion with the class. Further details will be announced closer to preliminarily scheduled dates.

Owing to the wide variety of techniques taught during the module practical sessions may be scheduled at slightly different times each week and in various locations depending on the subject taught. Therefore, it is important that you check your timetable at the beginning of each week.

Except in the case of illness, the 70% minimum attendance requirement applies to all aspects of the module (lectures, practicals and demonstrations).

**Syllabus (detailed lecture summaries and weekly readings)**
The following is an outline for the module as a whole, and identifies essential and supplementary readings relevant to each session. Information is provided as to where in the UCL library system individual readings are available; their location and Teaching Collection (TC) number, and status (whether out on loan) can also be accessed on the eUCLid computer catalogue system. Readings marked with an * are considered essential to keep up with the topics covered in the module. Copies of individual articles and chapters identified as essential reading are in the Teaching Collection in the Institute Library (where permitted by copyright) or are available online.

Students should check the ARCL0106 Moodle module website and their e-mail frequently as any changes to arrangements and other messages will be communicated by this means.

**Term 1 2018**

**Week 1: 1 October 2018 - morning**
*Caitlin R. O'Grady: (a) Introduction to module, and, (b) Introduction to materials, their structure and analytical methodologies applied to cultural heritage*

During the first week of class, the module structure, syllabus, aims, objectives, methods of assessment, etc., will be discussed and the module timetable (including practical sessions, teaching times and locations) highlighted. Lectures will also introduce the assessment of materials through investigations of the inter-relationships between their structure, properties and manufacturing method – all seen through the lens of culture.

- e-Book available online through UCL library
  - ISSUE DESK IOA ART 1
  - focus on Introduction, Chapter 2: Overview of the analytical techniques.


**Week 1: 1 October 2018 - afternoon**

*Caitlin R. O’Grady: Discussion of research projects*

The lecture will focus on the research project that students will be contributing to as part of their assigned coursework for ARCLG123 – specifically the analysis and identification of past treatment materials, and, elements of degradation associated with the assessed ceramics from IoA and PMEA collections.

**Week 2: 8 October 2018- morning**

*Caitlin R. O’Grady: Instrumental overview: spot testing and optical microscopy*

The lecture will provide an overview of optical microscopy, a technique available at the Institute, and, micro-chemical spot-testing for chemical characterization. The lecture will be followed by class discussion of assigned articles to be led by module co-ordinator.

Please also see reading for week 1!

  -e-Book available online through UCL library / ISSUE DESK IOA ART 1
  -focus on Introduction, Chapter 2: Overview of the analytical techniques


  -INST ARCH JDJ EST (reference only) / e-Book available online through UCL library

  -GEOLOGY D32 GRI

  -INST ARCH JKA Qto. MAC.

  -See A guide to thin section microscopy and polarized light microscope fundamentals.

  -INST ARCH LA ODE
  -Focus on Introduction; Chapter 3: Scientific method and techniques of spot testing; spot tests for carbonates, chlorides, nitrates, sulfates, protein (nitrogen) and nitrate (cellulose).
  ***There is a copy of the first edition in the conservation laboratory.***

  -INST ARCH AJ ROB


**Week 2:** 8 October 2018 – afternoon
Visit to PMEA/IoA – 14:00 – 17:00
Students will visit the Petrie Museum of Egyptian Archaeology to meet with Dr. Anna Garnett and discuss their project. This will be followed by discussion with Ian Carroll regarding the IoA objects including in their analytical project.

**Week 2 (CONT.):** 10 October 2018 (please note this is a Tuesday lecture with start time 10:00)
*Bill Sillar: Ceramic technology and degradation*
Owing to its wide spread use and durability, large quantities of ceramics are found in the archaeological record. Ceramics and the information archaeologists and conservators may retrieve from recovered ceramics will be addressed, as well as how this enables study of larger cultural and technological questions.


-INST ARCH KD KIN


-INST ARCH KD 3 ORT


-INST ARCH KA POT


-INST ARCH KD3 RIC


-INST ARCH 1754


-INST ARCH KD 1 RYE


**Week 3: 15 October 2018 – morning**

*Caitlin R. O’Grady: Adhesion/artefact sampling*

Practical – sampling: removal and preparation; preparation of adhesive reference tile

The lecture on adhesion will have a special focus on adhesives, adherands, their chemical/physical relationships, solubility and failure. The session will be followed by a lecture and practical focused on sampling with special attention to removal and preparation for analysis, as well the preparation of an adhesive reference tile sample.

Please also see reading for week 1!


-INST ARCH JDE HOR


-INST ARCH LA Qto AMB


**Week 3:** 15 October 2018 – afternoon

*Practical session with assigned artefacts – 14:00 – 17:00*

Students will work with assigned artefacts in the conservation laboratory.

**Week 4:** 22 October 2018 – morning

*Caitlin R. O’Grady: Instrumental overview – SEM and pXRF*

The lecture will give an overview of instrumental analysis concentrating on techniques available at the Institute - in particular scanning electron microscopy (SEM) and portable x-ray fluorescence (pXRF). There will be a brief introduction to terms and concepts used in analytical chemistry including a brief review of atomic structure, emission spectroscopy, energy sources and detectors. SEM and pXRF will be discussed in relationship to sample requirements and preparation, as well as produced data and methods of interpretation.

Please also see reading for week 1!


-Book available online through UCL library / ISSUE DESK IOA ART 1

-focus on Introduction, Chapter 2: Overview of the analytical techniques.


-Book available online through UCL library / ISSUE DESK IOA ART 1

-focus on Introduction, Chapter 2: Overview of XRF.

-INST ARCH JKA GOL

HITACHI HIGH-TECH. No date. *Let’s familiarize ourselves with the SEM*. Company promotional materials.

- Available through Moodle module website.


-INST ARCH JDD JAN


-e-Book available online through UCL library


-e-Book available online through UCL library / INST ARCH JKB SHU


-e-Book available online through UCL library / CUP. PHYSICS L30 WAT / INST ARCH JKA WAT (first edition)


**Week 4: 22 October 2018 – afternoon**

**Group 1 – 14:00 – 15:00**

**Group 2 – 15:00 – 16:00**

Tom Gregory: SEM/SEM-EDS orientation (B4) / Caitlin R. O’Grady: Practical work with research artefacts

This session will focus on introducing students to the Hitachi S-3400N SEM and EDS systems at the Institute of Archaeology. Students will be introduced to the proper use of the instrument including collection of secondary electron-, and backscatter electron images, as well as energy dispersive data.

Please note when students are not engaged in the SEM/SEM-EDS orientation, they will have the opportunity to work with their assigned artefacts in the conservation laboratory.
The way in which various types of stone are formed in the earth gives rise to particular characteristics in the resulting material (for example some stone is easily carved and relatively soft while some is hard and cannot easily be worked to produce fine detail). In this lecture, students are introduced to the geological processes that form the three main types of stone (igneous, sedimentary and metamorphic). These will be discussed particularly in relation to the resulting working properties of various types of stone and their subsequent uses. As well, there will be a brief introduction to how stone is quarried and shaped; followed by how the chemical and physical structure of stone effects its deterioration.


Week 5: 29 October 2018 – afternoon
Practical session with assigned artefacts – 14:00 – 17:00
Students will work with assigned artefacts in the conservation laboratory.

READING WEEK: 5–9 November 2018 (NO TEACHING)

Week 6: 12 November 2018 [start time 10:00]
Victoria Sainsbury: Glass, glazes and faience – chemistry and deterioration
The chemistry and structure of glasses resulting from different compositions and manufacturing techniques will be discussed. Mechanisms of glass deterioration will be discussed, as will factors affecting the rate of deterioration.


HECK, M., and P. Hoffmann. 2002. *Analysis of early medieval glass beads - the raw materials to produce green, orange and brown colours.*


Available on line and IN ENGLISH:


**Week 6: 12 – 16 November 2018**

*Compulsory SEM/SEM-EDS training and analysis session (rm. B4)*

Students will gain one-on-one training using the SEM/SEM-EDS and interpreting data.

**12 November – 13:00-17.00 (2 students)**  
CRO

**13 November – 13:00-17.00 (2 students)**  
CRO, TG/OFN

**15 November – 9:00-11.00 (1 student)**  
TG, OFN

**13:30-15:30 (1 student)**  
TG, OFN

**16 November – 9:00-17.00 (4 students)**  
TG, OFN
**Week 7: 19 November 2018 [start time 10:00]**

**Ruth Siddall: Pigments and pigment identification**

Whether naturally occurring or synthetically produced, pigments are materials exploited solely or primarily for their colouring properties. This lecture will introduce the three categories of pigments (inorganic, organic and synthetic) and examine the use in the historical record up to 1600 AD. Pigment nomenclature will be discussed, as will their physical properties.

-INST ARCH JDJ ART

-INST ARCH KN 1 Qtto BRE

-INST ARCH LA Qtto DAW

-INST ARCH JDJ DEL

-e-Book available online through UCL library / INST ARCH JDJ EST (reference only)

-INST ARCH JDJ FEL

-INST ARCH JDJ ART

-INST ARCH JDJ HAR

-See A guide to thin section microscopy and polarized light microscope fundamentals.

-INST ARCH AJ ROB

-INST ARCH JDJ ART

**Articles for student-led class discussion:** MCCrone, W.C. 1990. “The Shroud of Turin: blood or artist’s pigment?” *Accounts of chemical research* 23(3): 77-83.


**Week 7: 19 November 2018 – afternoon**

*Practical session with assigned artefacts – 14:00 – 17:00*

Students will work with assigned artefacts in the conservation laboratory.

**Week 8: 26 November 2018 (start time 10:00)**

**Ruth Siddall: Gypsum, lime mortar and hydraulic cements**

This session will cover the raw materials and the chemistry involved in the production of historically used plasters, mortars and cements. The properties and uses of the different materials are explained and relevant methods of scientific analysis employed in the study of such materials will be discussed.


-EGYPTOLOGY QUARTOS S 5 ABD


-Bartlett TP877 .E2 2005


-INST ARCH KN 1 Qto GOW


-INST ARCH LC ASH

-focus on Materials & History of Use – pp. 1-120; and Deterioration & Damage – pp. 121-162.


Week 8: 26 November 2018 – afternoon

Practical session with assigned artefacts – 14:00 – 17:00
Students will work with assigned artefacts in the conservation laboratory.

Week 9: 3 December 2018 – morning

Caitlin R. O’Grady: Instrumental overview: XRD, FTIR and Raman
The lecture will introduce the principles of XRD, FTIR, and Raman. Sample requirements and preparation will be discussed, as well as data produced by each technique and methods of interpretation.


-CHEMISTRY D 273 CUL


-INST ARCH JKB EDW


-INST ARCH JDD COL


NOAKE, E., D. LAU, and P. NEL, 2017. “Identification of cellulose nitrate based adhesive repairs in archaeological pottery of the University of Melbourne’s Middle Eastern archaeological pottery collections
Week 9: 3 – 7 December 2018

**FTIR training (B4)**

Students will learn to use the FTIR in order to prepare samples, collect data and interpret results.

3 December 2018 – 13:00 – 17:00 pm (2-3 students)
4 December 2017 – 14:00 – 17:00 (2 students)
7 December 2017 – 9.00 – 13.00 (5 students)

Week 10: 10 December 2018 – morning

**Miljana Tadivojevic : Copper and copper alloys**

This session will focus specifically on copper and copper alloys and will discuss manufacture, technology and metallurgy as well as different alloy compositions and their effects on the metal produced. Appropriate methods of analysis for the study of copper and copper alloy artefacts will also be discussed.


**Week 10: 10 December 2018 – afternoon**

Practical session with assigned artefacts – 14:00 – 17:00

Students will work with assigned artefacts in the conservation laboratory.

Term 2 2019  **Please note that some sessions in term 2 are still be confirmed.**

**Week 11: 7 January 2019**

Michael Charlton: Iron working: technology and corrosion

Continuing with the metals theme, in week 11 we move on to discuss iron working and technology; and corrosion. As in previous sessions, we will discuss manufacture, technology and metallurgy as well as different alloy compositions and their effects on the metal produced. Time will also be given to discussion of appropriate methods of analysis for the study of iron and steel artefacts.


-INST ARCH KEB 2 Qto SCO


**Week 12: 14 January 2019**

*Caitlin R. O’Grady: Analytical data, interpretation and presentation*

This session will look at the types of analytical data collected to answer research questions and discuss various methods of interpretation and presentation to various audiences.


[INST ARCH AK 10 DRE]


- e-Book available online through UCL library


[HISTORY OF SCIENCE Y 11 EBE]


   -e-Book available online through UCL library
   -INST ARCH JKB SHU

   -e-Book available online through UCL library
   -INST ARCH JKB SHU

   -HISTORY OF SCIENCE A 9 VA


**Articles for student-led class discussion:** Each student will suggest an article that incorporates analytical data for assessment in class on or before 14 December 2018. The selected article should be applicable to their identified research questions.

**Week 13: 21 January 2019**
*Phillip Austin: Wood structure and practical identification session*
This session will focus on the structure and anatomy of wood and how these effect species selection in the past. The session will aim to familiarize the student with the structure of wood in order to aid them in species identification and is followed by a practical class in wood identification.

   -INST ARCH KC HAT

   -INST ARCH KC Qto HOA

   INST ARCH JDB MIL

**Week 14: 29 January 2018 (start time 10:30)**
*Emma Richardson: Plastic chemistry, properties and technology*
The chemistry, properties and technology of plastics will be discussed as they relate to the production of art objects, and, conservation materials. Deterioration mechanisms will also be discussed as they relate to both materials and art objects.


--See Moodle module website for digital copy


-INST ARCH JDB MIL

**Week 15: 4 February 2019**

**Gustave Milne and Dean Sully: Wood technology and deterioration**

Building on the previous session, these lectures will focus on wood technology and deterioration in order to answer the following questions: How is wood used, shaped and formed? How does wood macro-structure lend itself to certain tasks?


**READING WEEK: 11 – 15 February 2019 (No teaching)**

Students encouraged to collect analytical data for research projects during this week.

**Week 16: 18 February 2019**

*Caroline Cartwright: Plant and animal fibres*
*Sandra Bond: Practical session – fibre sample preparation and identification (TBC)*

This session will focus on sources of plant and animal fibres, their structure, appearance, and the processes involved in their production. The session will be followed by a practical session on the identification of fibres using a range of diagnostic features.


INST ARCH JDB MIL


INST ARCH KI WIL

**Week 17: 25 February 2019**

No session planned.

**Week 17: 1 March 2019 (please note this is a Friday session and it is double for both ARCL0106 and ARCL0104)**

**Matija Strlič: Paper chemistry, technology, degradation and conservation**

This session will focus on the chemistry of paper, as well as manufacturing technologies. Degradation and methods of conservation will also be discussed.


- INST ARCH LA MAY


- INST ARCH KH Qto DAN


**Week 18: 4 March 2019**

**Dean Sully: Skin and Leather: technology and processing**

This session will focus on skin/leather as, its acquisition, processing techniques and degradation. The structure of skin will be addressed on a microscopic level in order to enable the student to identify and locate diagnostic features. The class will include a practical session on microscopic identification of leather species, condition assessment methodologies and tests for deteriorated leather.


**Week 19: 11 March 2019 [start time 10:00]**

*Margarita Gleba: Textile technology, examination*

This session will focus on the production of textiles and woven structures. Methods of examination will be discussed as they relate to the analysis of woven materials in order to discover the methods employed in their manufacture.


**Articles for student-led class discussion:**


**Week 20: 18 March 2019 – TBC**

*Daniel Antoine: Animal hard tissues – bone, teeth, ivory, horn, antler, shell*

In this session the micro structure of different hard tissues will be examined and we will discuss what they consist of and how they are produced. This will lead us onto an understanding of the features present in each type of material that can aid us in their identification. This session will be followed by a demonstration/practical in identifying hard tissue materials in objects.


4 ONLINE RESOURCES
The full UCL Institute of Archaeology coursework guidelines are given here:
http://www.ucl.ac.uk/archaeology/administration/students/handbook

The full text of this handbook is available here (includes clickable links to Moodle and online reading lists):
http://www.ucl.ac.uk/archaeology/administration/staff/handbook

Moodle
There is a Moodle module associated with this core unit, please make sure you sign up so that you can benefit from the extra resources available in this location. The module title is as follows: ARCL0106 Conservation Materials Science and you can log in to the Moodle system here:
http://moodle.ucl.ac.uk/login/

Online reading list
A full online reading list is available from the UCL library website (search for ARCL0106) and the Moodle module website:
http://readinglists.ucl.ac.uk/index.html
http://moodle.ucl.ac.uk/login/

5 ADDITIONAL INFORMATION
LIBRARIES AND OTHER RESOURCES
In addition to the Library of the Institute of Archaeology, other libraries in UCL with holdings of particular relevance to this module are:
Main Library, Wilkins Building, Gower Street, WC1E 6BT
Bartlett Library, Ground Floor, Central House, 14 Upper Woburn Place, WC1H 0NN
Science library, DMS Watson Building, Malet Place, London, WC1E 6BT
Libraries outside of UCL, which have holdings which may also be relevant to this degree are:
The British Museum Conservation Department Library to which you are admitted as a conservation student of this institute (see separate leaflet on access to, and rules for the use of, this library).

INFORMATION FOR INTERCOLLEGIATE AND INTERDEPARTMENTAL STUDENTS
Students enrolled in Departments outside the Institute should obtain the Institute’s coursework guidelines from Judy Medrington (email j.medrington@ucl.ac.uk), which will also be available on the IoA website.

HEALTH AND SAFETY
The Institute has a Health and Safety policy and code of practice which provides guidance on laboratory work, etc. This is revised annually and the new edition will be issued in due module. All work undertaken in the Institute is governed by these guidelines and students have a duty to be aware of them and to adhere to them at all times. This is particularly important in the context of the laboratory work, which will be undertaken as part of this module.
APPENDIX A: POLICIES AND PROCEDURES 2018-19 (PLEASE READ CAREFULLY)
This appendix provides a short précis of policies and procedures relating to modules. It is not a substitute for the full documentation, with which all students should become familiar. For full information on Institute policies and procedures, see the IoA Student Administration section of Moodle: https://moodle.ucl.ac.uk/course/view.php?id=40867

For UCL policies and procedures, see the Academic Regulations and the UCL Academic Manual: http://www.ucl.ac.uk/srs/academic-regulations; http://www.ucl.ac.uk/academic-manual/

GENERAL MATTERS
ATTENDANCE: A minimum attendance of 70% is required. A register will be taken at each class. If you are unable to attend a class, please notify the lecturer by email.

DYSLEXIA: If you have dyslexia or any other disability, please discuss with your lecturers whether there is any way in which they can help you. Students with dyslexia should indicate it on each coursework cover sheet.

COURSEWORK
LATE SUBMISSION: Late submission will be penalized in accordance with current UCL regulations, unless formal permission for late submission has been granted.
The UCL penalties are as follows:
- The marks for coursework received up to two working days after the published date and time will incur a 10 percentage point deduction in marks (but no lower than the pass mark).
- The marks for coursework received more than two working days and up to five working days after the published date and time will receive no more than the pass mark (40% for UG modules, 50% for PGT modules).
- Work submitted more than five working days after the published date and time, but before the second week of the third term will receive a mark of zero but will be considered complete.

GRANTING OF EXTENSIONS: Please note that there are strict UCL-wide regulations with regard to the granting of extensions for coursework. You are reminded that Module Co-ordinators are not permitted to grant extensions. All requests for extensions must be submitted on the appropriate UCL form, together with supporting documentation, via Judy Medrington’s office and will then be referred on for consideration. Please be aware that the grounds that are acceptable are limited. Those with long-term difficulties should contact UCL Student Disability Services to make special arrangements. Please see the IoA website for further information. Additional information is given here http://www.ucl.ac.uk/srs/academic-manual/c4/extenuating-circumstances/

RETURN OF COURSEWORK AND RESUBMISSION: You should receive your marked coursework within one month of the submission deadline. If you do not receive your work within this period, or a written explanation, notify the Academic Administrator. When your marked essay is returned to you, return it to the Module Co-ordinator within two weeks. You must retain a copy of all coursework submitted.

CITING OF SOURCES and AVOIDING PLAGIARISM: Coursework must be expressed in your own words, citing the exact source (author, date and page number; website address if applicable) of any ideas, information, diagrams, etc., that are taken from the work of others. This applies to all media (books, articles, websites, images, figures, etc.). Any direct quotations from the work of others must be indicated as such by being placed between quotation marks. Plagiarism is a very serious irregularity, which can carry heavy penalties. It
is your responsibility to abide by requirements for presentation, referencing and avoidance of plagiarism. Make sure you understand definitions of plagiarism and the procedures and penalties as detailed in UCL regulations: http://www.ucl.ac.uk/current-students/guidelines/plagiarism

RESOURCES
MOODLE: Please ensure you are signed up to the module on Moodle. For help with Moodle, please contact Charlotte Frearson (c.frearson@ucl.ac.uk)

INSTITUTE OF ARCHAEOLOGY COURSEWORK PROCEDURES
General policies and procedures concerning modules and coursework, including submission procedures, assessment criteria, and general resources, are available on the IoA Student Administration section of Moodle: https://moodle.ucl.ac.uk/module/view.php?id=40867. It is essential that you read and comply with these. Note that some of the policies and procedures will be different depending on your status (e.g. undergraduate, postgraduate taught, affiliate, graduate diploma, intercollegiate, interdepartmental). If in doubt, please consult your module co-ordinator.

GRANTING OF EXTENSIONS: Note that there are strict UCL-wide regulations with regard to the granting of extensions for coursework. Note that Module Co-ordinators are not permitted to grant extensions. All requests for extensions must be submitted on the appropriate UCL form, together with supporting documentation, via Judy Medrington’s office and will then be referred on for consideration. Please be aware that the grounds that are acceptable are limited. Those with long-term difficulties should contact UCL Student Support and Wellbeing to make special arrangements. Please see the IoA Student Administration section of Moodle for further information. Additional information is given here http://www.ucl.ac.uk/srs/academic-manual/c4/extenuating-circumstances/
### Appendix B: Assessment Criteria

#### ARC0106 2018-19 Conservation Materials Science

**SEM/SEM-EDS sample analytical summary (part a) – Assessment Form**

<table>
<thead>
<tr>
<th>Student:</th>
<th>Date:</th>
</tr>
</thead>
</table>

### PAPER CONTENT

**PAPER** (100 total points possible)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Suggestions for improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>Description of sample (15):</strong> make sure to describe the sample in terms of material class (adhesive, consolidant, fill, overpaint, residue, etc.); description of sample in visible light including colour, stratigraphy/structure, homogeneity/heterogeneity, material properties, etc.</td>
<td></td>
</tr>
<tr>
<td>2. <strong>Discussion of sampling methodology and sample preparation (15):</strong> clear justification for removing sample for SEM/SEM-EDS analysis; location of sample on artefact identified and described; any sampling limitations described; method of sample preparation (dispersed, embedded, coated, etc.) with details regarding materials and instrumentation used</td>
<td></td>
</tr>
<tr>
<td>3. <strong>Description of analytical parameters used to collect image and/or spectral data (15):</strong> instrument make and model of SEM/SEM-EDS, as well as analysis conditions for data collection (accelerating voltage, data collection time/dead time, working distance, magnification, image type, calibration method used, etc.)</td>
<td></td>
</tr>
<tr>
<td>4. <strong>Discussion of sample data (15):</strong> referring to collected data (secondary electron/backscatter electron image, and/or energy dispersive spectrum), discuss observed features in images or elemental data (structure/stratigraphy, particle size/shape, z-contrast, elemental composition, etc.); interpret data with reference to artefact/research questions; where possible annotate data images</td>
<td></td>
</tr>
<tr>
<td>5. <strong>Originality and independent thinking (10):</strong> critical reflection, evaluation of evidence, original insight, interpretation</td>
<td></td>
</tr>
<tr>
<td>6. <strong>Sources (10):</strong> bibliography – range; relevance and formatting</td>
<td></td>
</tr>
<tr>
<td>7. <strong>Images/tables (20):</strong> image of sample, its original location on the artefact; as well as images and elemental data collected using SEM instrumentation; images must include a scale or magnification and annotations as necessary to define areas for interpretation</td>
<td></td>
</tr>
</tbody>
</table>

**Best features**

<table>
<thead>
<tr>
<th>First examiner’s mark &amp; signature</th>
<th>Date</th>
<th>Second Examiner’s mark &amp; signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Final Internal Mark</th>
<th>External Mark</th>
<th>Final Mark</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Appendix B: Assessment Criteria

#### ARCL0106 2018-19 Conservation Materials Science

**Analytical Research Proposal (part b) – Assessment Form**

<table>
<thead>
<tr>
<th>Student:</th>
<th>Date:</th>
</tr>
</thead>
</table>

| **PAPER CONTENT** |  |
| **PAPER** (100 total points possible) |  |
| **Criteria** | **Suggestions for improvement** |
| 1. Abstract and 3-6 subject keywords (5): 100 word abstract clearly describing analytical problem, data required to answer problem, analytical techniques used and summary of preliminary observations/results; abstract must be a stand-alone document that completely summarizes proposal; keywords must relate to proposed research |  |
| 2. Problem statement (5): clear statement of reason for analysis – including data needed to answer your question (microstructure, particle size/shape, elemental/crystalline, quantitative/semi-quantitative, spectral/numerical, solubility, chemical alteration, etc.), as well as analytical techniques you propose to use |  |
| 3. Literature Review (20): selection of evidence bearing on the objectives of research, selection of appropriate case-studies or examples to contextualize discussed research |  |
| 4. Description and discussion of samples/object (15): clear description of object or samples associated with proposed research including material, method of manufacture, stratigraphy and structure; description of object/sample condition and discussion of potential impact on proposed research |  |
| 5. Proposed experimental procedure (15): clear discussion of proposed methods to be used during preparation and analysis of selected samples; what is measured and how; proposed number/type of samples analyzed, their method of preparation and any sampling limitations; justification of samples; proposed instruments (make and model) used to collect data, suggested analytical conditions, etc. |  |
| 6. Originality and independent thinking (10): critical reflection, evaluation of evidence, original insight, interpretation |  |
| 7. Writing quality (10): spelling, grammar, punctuation, paragraphing, use of vocabulary, accuracy, formatting |  |
| 8. Sources (10): bibliography – range; relevance and formatting |  |
| 9. Data/images/tables (5): clear documentation and legible presentation of object and data; annotate where necessary |  |
| 10. Supplementary information (5): summary of proposed time schedule for research including experimental design and sample preparation methods |  |

**Best features**

<table>
<thead>
<tr>
<th>First examiner’s mark &amp; signature</th>
<th>Date</th>
<th>Second Examiner’s mark &amp; signature</th>
<th>Date</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Final Internal Mark</th>
<th>External Mark</th>
<th>Final Mark</th>
<th>Date</th>
</tr>
</thead>
</table>
## Appendix B: Assessment Criteria

### ARCL0106 2018-19 Conservation Materials Science

**Analytical Research Report – Assessment Form**

**Student:**  
**Date:**

<table>
<thead>
<tr>
<th>PAPER CONTENT</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PAPER</strong> (100 total points possible)</td>
<td></td>
</tr>
<tr>
<td><strong>Criteria</strong></td>
<td><strong>Suggestions for improvement</strong></td>
</tr>
<tr>
<td>1. Abstract and 3-6 subject keywords (5): 100 word abstract clearly describing analytical problem, data required to answer problem, analytical techniques used and summary of preliminary observations/results; abstract must be a stand-alone document that completely summarizes research; keywords must relate to analytical research</td>
<td></td>
</tr>
<tr>
<td>2. Problem statement (5): clear statement of reason for analysis – including data and analytical techniques used to answer your research question</td>
<td></td>
</tr>
<tr>
<td>3. Literature Review (10): selection of evidence bearing on the objectives of research, selection of appropriate case-studies or examples to contextualize discussed research</td>
<td></td>
</tr>
<tr>
<td>4. Experimental procedure (10): clear discussion of methods used during preparation and analysis of selected samples; what is measured and how; number/ type of samples analyzed, their method of preparation and any sampling limitations; instruments (make and model) used, analysis conditions, etc.</td>
<td></td>
</tr>
<tr>
<td>5. Data results (15): clear reporting and description of collected data and summary using charts, spectra, images, figures, and appendices (if present); must be legible and clear to reader; annotated where necessary</td>
<td></td>
</tr>
<tr>
<td>6. Discussion of data interpretation (15): what do results mean and how do they answer questions proposed in research; how do they compare to published literature; suggestions for future work</td>
<td></td>
</tr>
<tr>
<td>7. Originality and independent thinking (10): critical reflection, evaluation of evidence, original insight, interpretation</td>
<td></td>
</tr>
<tr>
<td>8. Writing quality (10): spelling, grammar, punctuation, paragraphing, use of vocabulary, accuracy, formatting, citations</td>
<td></td>
</tr>
<tr>
<td>9. Sources (10): bibliography – range; relevance and formatting</td>
<td></td>
</tr>
<tr>
<td>10. Acknowledgements (5): identification of those scientists/specialists who helped with analytical techniques and data interpretation; source of research project</td>
<td></td>
</tr>
<tr>
<td>11. Submission of report and collected data/documentation to object owner (5): preparation and submission of completed analytical report (electronic &amp; paper) to object owner; submission of electronic copy of all data and documentation to object owner</td>
<td></td>
</tr>
</tbody>
</table>

### Best features

<table>
<thead>
<tr>
<th>First examiner’s mark &amp; signature</th>
<th>Date</th>
<th>Second Examiner’s mark &amp; signature</th>
<th>Date</th>
<th>Final Internal Mark</th>
<th>External Mark</th>
<th>Final Mark</th>
<th>Date</th>
</tr>
</thead>
</table>

44