MSC ENVIRONMENTAL ARCHAEOLOGY (2017) PRACTICAL OPTION

Archaeobotanical Analysis in Practice

ARCLG 101 (0.5 units)

SHORT INTENSIVE COURSE ~40 hours over 5 DAYS on the practical hands-on aspects of sorting, identification, and quantification archaeobotanical macro-remains, with an emphasis on seeds. The course is focused on economically-important Old World plant categories (such as cereals, pulses, oil seeds) and on systematic groupings (key families and orders, such as those that recur as arable weeds in the Old World).

Co-ordinated by Professor Dorian Q Fuller d.fuller@ucl.ac.uk
Tel:   +44 (0)207679 4771

with contributions by:

Sue Colledge s.colledge@ucl.ac.uk,
Eleanore Kingwell-Banham- e.kingwell-banham.09@ucl.ac.uk
Chris Stevens c.stevens@ucl.ac.uk
Michèle Wollstonecroft m.wollstonecroft@ucl.ac.uk

[Feb 13-17, 2017]
Archaeobotany/Palaeoecology Lab (IoA Room 313)
Turnitin code: 3225938

See Appendix B (page 26) at the end of this document for important information about submission and marking procedures, and/or links to the relevant webpage
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table of Contents</td>
<td></td>
</tr>
<tr>
<td>SCHEDULE, LECTURE NUMBER and SESSION INSTRUCTOR</td>
<td>3</td>
</tr>
<tr>
<td>COURSE INTRODUCTION &amp; AIMS</td>
<td>4</td>
</tr>
<tr>
<td>PREPARATION in ADVANCE of THE COURSE: BACKGROUND READING:</td>
<td>4</td>
</tr>
<tr>
<td>A. General archaeobotany &amp; aims</td>
<td>4</td>
</tr>
<tr>
<td>B. Quantification in archaeobotany</td>
<td>5</td>
</tr>
<tr>
<td>C. Wild progenitors &amp; crop origins</td>
<td>6</td>
</tr>
<tr>
<td>D. Reference texts on seeds/archaeobotanical</td>
<td>8</td>
</tr>
<tr>
<td>TEACHING STRUCTURE &amp; ENVIRONMENT</td>
<td>9</td>
</tr>
<tr>
<td>STANDARD OF LABORATORY PRACTICE</td>
<td>9</td>
</tr>
<tr>
<td>WORKLOAD</td>
<td>9</td>
</tr>
<tr>
<td>ATTENDANCE</td>
<td>9</td>
</tr>
<tr>
<td>ASSESSMENT (for enrolled MSc students) is in three parts:</td>
<td>9</td>
</tr>
<tr>
<td>A. Lab notebook/sketchbook (10% mark)</td>
<td>9</td>
</tr>
<tr>
<td>B. Practical exam (40% mark)</td>
<td>10</td>
</tr>
<tr>
<td>C. Written assignment: Practical Essay (50% mark)</td>
<td>11</td>
</tr>
<tr>
<td>RESOURCES</td>
<td>12</td>
</tr>
<tr>
<td>HEALTH AND SAFETY</td>
<td>13</td>
</tr>
<tr>
<td>LECTURES: CONTENT AND READINGS</td>
<td>13</td>
</tr>
<tr>
<td>Lecture 1: FRUITS, SEEDS &amp; SEED-ALIKES: defining basic categories.</td>
<td>13</td>
</tr>
<tr>
<td>Lecture 3 OVERVIEW OF TAXONOMY, PLANT EVOLUTION &amp; PLANT STRUCTURE (determinate and indeterminate structure).</td>
<td>15</td>
</tr>
<tr>
<td>Lecture 4: INTRODUCTION TO PULSE IDENTIFICATION(Fabaceae/Leguminoseae)</td>
<td>15</td>
</tr>
<tr>
<td>Lecture 5: Turning Flowers into Fruits: Examples of the Solanaceae &amp; Rosaceae.</td>
<td>16</td>
</tr>
<tr>
<td>Lecture 6 &amp; LABWORK exercise: sorting flotation samples for SEEDS</td>
<td>16</td>
</tr>
<tr>
<td>Lecture 7: An INTRODUCTION to NUTS</td>
<td>17</td>
</tr>
<tr>
<td>Lecture 8: MONOCOTYLEDONS</td>
<td>17</td>
</tr>
<tr>
<td>Lecture 9: NUTLETS: Polygonaceae, Cyperaceae &amp; related groups (Fuller)</td>
<td>17</td>
</tr>
<tr>
<td>Lecture 10: An INTRODUCTION to OILSEED &amp; FIBRE CROPS</td>
<td>18</td>
</tr>
<tr>
<td>Lecture 11: BASAL EUDICOT SEEDS &amp; FRUITS</td>
<td>19</td>
</tr>
<tr>
<td>Lecture 12: SESAME, FLAX, GOURDS &amp; MELONS: Pedaliaceae, Linaceae, Cucurbitaceae</td>
<td>19</td>
</tr>
<tr>
<td>Lecture 13: CEREAL Identification Part 2</td>
<td>20</td>
</tr>
<tr>
<td>Lecture 14 &amp; LABWORK EXERCISE: Counting, Drawing &amp; measuring cereals</td>
<td>20</td>
</tr>
<tr>
<td>Lecture 15. CEREAL IDENTIFICATION PART 3: Millets</td>
<td>21</td>
</tr>
<tr>
<td>Lecture 16: DISCUSSION ABOUT CROP-PROCESSING &amp; REVIEW OF CEREALS</td>
<td>23</td>
</tr>
<tr>
<td>Lecture 17: SELECT GROUP OF COMMON WEEDS: Brassicaceae, small legumes, Euphorbiaceae, Labiatae, Chenopodiaceae Polygonaceae</td>
<td>23</td>
</tr>
<tr>
<td>APPENDIX A: BEYOND SEEDS</td>
<td>23</td>
</tr>
<tr>
<td>APPENDIX B: UCL POLICIES AND PROCEDURES 2016-17</td>
<td>26</td>
</tr>
<tr>
<td>Day/Time</td>
<td>Lecture/Quiz Number, Content &amp; Instructor **</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td><strong>DAY 1 MORNING</strong></td>
<td>1. LECTURE: Fruits, Seeds &amp; Seed-Alikes: defining basic categories. [DF]</td>
</tr>
<tr>
<td></td>
<td>• COFFEE BREAK</td>
</tr>
<tr>
<td><strong>DAY 1 AFTERNOON</strong></td>
<td>3. LECTURE: Overview of Taxonomy, Plant Evolution &amp; Plant Structure (determinate and indeterminate structure). [DF]</td>
</tr>
<tr>
<td></td>
<td>• COFFEE BREAK</td>
</tr>
<tr>
<td></td>
<td>4. LECTURE: Introduction to PULSE identification [EKB]</td>
</tr>
<tr>
<td><strong>DAY 2 MORNING</strong></td>
<td>5. LECTURE: Turning Flowers into Fruits: Examples of the Solanaceae &amp; Rosaceae. [DF]</td>
</tr>
<tr>
<td></td>
<td>• COFFEE BREAK</td>
</tr>
<tr>
<td></td>
<td>6. LAB exercise: Sorting flotation samples for SEEDS [SC &amp; CS]</td>
</tr>
<tr>
<td><strong>DAY 2 AFTERNOON</strong></td>
<td>7. LECTURE: An introduction to NUTS [DF]</td>
</tr>
<tr>
<td></td>
<td>• COFFEE BREAK</td>
</tr>
<tr>
<td></td>
<td>8. LECTURE: Monocotyledons [DF]</td>
</tr>
<tr>
<td><strong>DAY 3 MORNING</strong></td>
<td>REVIEW QUIZ I [DF]</td>
</tr>
<tr>
<td></td>
<td>• COFFEE BREAK</td>
</tr>
<tr>
<td></td>
<td>9. LECTURE: Nutlets: Polygonaceae, Cyperaceae &amp; related groups. [DF]</td>
</tr>
<tr>
<td></td>
<td><strong>Trip to Drummond Street and lunch</strong></td>
</tr>
<tr>
<td><strong>DAY 3 AFTERNOON</strong></td>
<td>10. LECTURE: An introduction to OILSEED &amp; FIBRE CROPS. [DF]</td>
</tr>
<tr>
<td></td>
<td>• COFFEE BREAK</td>
</tr>
<tr>
<td><strong>DAY 4 MORNING</strong></td>
<td>REVIEW QUIZ II</td>
</tr>
<tr>
<td></td>
<td>• COFFEE BREAK</td>
</tr>
<tr>
<td></td>
<td>12. LAB EXERCISE &amp; LECTURE: Sesame, Flax, Gourds &amp; Melons [DF]</td>
</tr>
<tr>
<td><strong>DAY 4 AFTERNOON</strong></td>
<td>13. LECTURE: CEREAL Identification Part 2 [SC &amp; CS]</td>
</tr>
<tr>
<td></td>
<td>• COFFEE BREAK</td>
</tr>
<tr>
<td></td>
<td>14: LABWORK EXERCISE: Counting, Drawing &amp; measuring cereals [CS &amp; SC]</td>
</tr>
<tr>
<td><strong>DAY 5 MORNING</strong></td>
<td>15. LECTURE: Cereal identification Part 3. Millets [DF &amp; EKB]</td>
</tr>
<tr>
<td></td>
<td>• COFFEE BREAK</td>
</tr>
<tr>
<td></td>
<td>16. Discussion about Crop-Processing and review of cereals [DF]</td>
</tr>
<tr>
<td><strong>DAY 5 AFTERNOON</strong></td>
<td>17. LECTURE: Select Group of Common Weeds: Brassicaceae, small legumes, Euphorbiaceae, Labiatae, Chenopodiaceae, Polygonaceae. [DF]</td>
</tr>
<tr>
<td></td>
<td>• COFFEE BREAK</td>
</tr>
<tr>
<td></td>
<td>REVIEW QUIZ III [DF]</td>
</tr>
</tbody>
</table>

**DF = Dorian Fuller; SC = Sue Colledge; CS = Chris Stevens; EKB = Eleanore Kingwell-Banham**
COURSE INTRODUCTION and AIMS
The overall aim of this course is to prepare students on the practical hands-on aspects of sorting, identification, quantification and reporting of archaeobotanical macro-remains. It is designed to provide an introduction to archaeobotany methods for students who do not have archaeobotany experience as well as providing those who have previous archaeobotany experience with an opportunity to enhance their practical skills. Lectures are focused in most detail on major Old World seed crops (including Near Eastern/European as well as South/East Asian and African taxa) and systematic groupings (key families and orders, such as those that recur as arable weeds in the Old World). The course provides basic methodological tools for seed identification that can be applied to other taxa (and from other regions, e.g. New World species) as well as supervised sessions on sorting flotation samples, drawing, measuring and counting seeds and using the seed comparative collections.

Wood charcoal, parenchyma tissue and phytoliths are not discussed in this course; readings on these subjects are listed in APPENDIX A (page 23).

PREPARATION in ADVANCE of the COURSE: BACKGROUND READING
This short course is focused on seed identification, and while there will be some discussion of topics such as archaeobotanical research questions, quantification and field sampling, these are not covered in detail. (MSc students get further coverage of these topics in the Environmental Archaeology in Practice core course or the Resources & Subsistence core course).

It is highly recommended that you do some preparatory background readings on three aspects of archaeobotany before coming the course. Some suggested readings, on the following subjects, are listed below:

a. the aims and practices of archaeobotany in general;
b. quantification in archaeobotany;
c. wild progenitors and crop origins;
d. books on seed identification.

A). General Archaeobotany & Aims
Readings presented in this section provide introductions to archaeobotanical analysis and the overall aims of archaeobotany that are particularly helpful for those less familiar with this topic.


Miksicek, C. H. 1987. Formation Processes of the Archaeobotanical Record. Advances in Archaeological Method and Theory 10, pp. 211-247 Although somewhat dated, provides useful overviews of the types of environments within which plant remains best survive as well as the types of plant parts that best survive.
Minnis, P.E. 1981. Seeds in Archaeological Sites: Sources and Some Interpretive Problems
American Antiquity 46, 143-152


❖ For the history of flotation, see: //sites.google.com/site/archaeobotany/

Further Useful Volumes of Archaeobotanical Case Studies.


B). Quantification in Archaeobotany

The two papers below present systems for observing, recording and quantifying preservation condition of cereals and other seeds in order to establish more accurate seed counts and/or seed MNIs.


Van der Veen, M. 1992. Crop Husbandry Regimes. Sheffield Archaeological Monographs. See in particular discussion on crop-processing, producer-consumer models, and introduction of multivariate analysis approaches
C. Wild progenitors and crop origins

The following readings consider how an understanding of botany contributes to identifying where cultivation took place, and the mapping and ecology of wild progenitors and how these differ from their domesticated progeny. These sources also consider the domestication process and traits.

Fuller, D. Q. 2002. Fifty Years of Archaeobotanical Studies in India: Laying a Solid Foundation. In Settar, S., Korisettar, R. (Eds.). Indian Archaeology in Retrospect, Volume III. Archaeology and Interactive Disciplines (pp.247-364). New Delhi: Manohar. *This summarizes what the main cereals and pulses of India, including native wild progenitors, as well as a history of research in India. Some of this information has been updated/superseded by subsequent Fuller publications.*

Harlan, J. 1992. *Crops and Man,* second edition. Madison: American Society of Agronomy. *This is more general and global than Zohary and Hopf (see below) and it has good overviews on maize origins, African crop origins, and an increasingly dated summary on East Asia.*


OPTIONAL READING ON CROP DIFFUSION: The spread of Near Eastern crops into Europe


**Note: For East Asia: there is no particularly up to date and compressive source. A good overview of geographical origins for crops in the region is:**


**Further useful background texts on food crops/ crop origins**

*The Oxford [or illustrated] Book of Food Plants.* Oxford University Press. [Well-illustrated, many editions]


**D.) Reference texts on seed/ archaeobotanical identification**

Bekker, R.M., Cappers, R. T.J and Neef, R. 2011. Digital Atlas of Economic Plants in Archaeology. The Digital Atlas series (including Cappers, R. T.J., Bekker, R. M. and Jans, J.E.A. 2009. Digital Atlas of Economic Plants) *is well illustrated and provides detailed information. supported by online databases. This series is a joint project of the Groningen Institute of Archaeology (GIA), the Community and Conservation Ecology Group (COCON), both of the University of Groningen (the Netherlands), and the Deutsches Archäologisches Institut (DAI, Berlin, Germany).*

Jensen, H Arne. 1998. *Bibliography on seed morphology*. Balkema, Rotterdam. INST ARCH BB 5 JEN

The three papers below are valuable examples of archaeobotanical charring experiments that observe changes in seed size and shape that result from carbonization.


**Further general reference texts on plant systematics/ taxonomy**


Mabberley, D. J. *The Plant Book*. Cambridge University Press. (3 editions, all useful, but more recent is best)

[This book revised and replaces the still useful dictionary of Willis (*A Dictionary of Flowering Plants and Ferns*. Cambridge University Press., which went through many editions, often available second hand)]


**DURING THE COURSE, MANY OTHER USEFUL MANUALS WILL BE AVAILABLE ON THE LABORATORY SHELVES.**

**TEACHING STRUCTURE and ENVIRONMENT**

The course is taught formally through an intensive, 1-week, 40-hour, 8-hour daily short course. It is held in the in the Institute of Archaeology Archaeobotany Laboratory. Classes are taught through lectures and observational studies (using low-powered binocular microscopes) of seed specimens from the IoA Archaeobotany comparative collections. Altogether there are 17 lectures/laboratory sessions, with three practice (i.e. unassessed) quizzes. The course is taught primarily by Professor Dorian Fuller, with significant contributions from other experienced archaeobotanists from the UCL Institute of Archaeology.

**STANDARD OF LABORATORY PRACTICE FOR Using the Institute of Archaeology Archaeobotany Laboratory:** It is expected that all participants will practice good standard laboratory practice. All reference material MUST be returned to its correction location in the
collections so that others may consult it. Bench areas must be left clean: i.e. microscopes should be covered when not in use, glassware and other supplies should be washed and/or put away, the bench area wiped of any debris.

WORKLOAD

MSc enrolled students are expected to invest additional time in the laboratory, subsequent to the short course, to study and draw specimens from the comparative collection in their individual laboratory notebooks as well as for assigned suggested readings. You should expect to spend at least a half day per week over the remainder of Term II and first part of Term III. The final assessments-- an essay, lab notebook and exam, will be scheduled for Term III (~ 1st week of June).

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>HOURS TYPICALLY INVESTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture/Formal Lab time</td>
<td>40</td>
</tr>
<tr>
<td>Reading</td>
<td>40</td>
</tr>
<tr>
<td>Revision (studying &amp; drawing specimens)</td>
<td>40</td>
</tr>
<tr>
<td>Assessed Coursework</td>
<td>30</td>
</tr>
<tr>
<td>TOTAL</td>
<td>150</td>
</tr>
</tbody>
</table>

ATTENDANCE

As practical courses are taught as an intensive week it is strongly recommended that these are not missed.

If you are unable to attend a class, please notify the lecturer by email.

FOR REGISTERED UCL MASTERS STUDENTS: minimum attendance of 70% is required, except in case of illness or other adverse circumstances which are supported by medical certificates or other documentation. A register will be taken at each class.

The next sections below are for assessed MSc/MA students.

Skip to page 11 for Resources, to page 13 for Health & Safety, & to page 13 for Lecture Content and Readings

ASSESSMENT (for enrolled IOA MSc students): (Note: criteria for assessment of marks is explained in Appendix B on pages 27-30):

Examination of this course is through 3 pieces of assessed coursework:

1. Practical lab notebook (10% of final mark),
2. Practical exam (40% of final mark).
3. Written assignment: Practical Essay (50% of final mark),

1. PRACTICAL LAB NOTEBOOK/ SKETCHBOOK: 10%. Due on the day of the practical exam. Each student is required to assemble a lab notebook. The notebook is intended to serve as a useful resource both during and beyond the course. It is a place to keep course handouts (on seed identification criteria etc.) as well as any drawings and notes made in class or in open lab time on seeds (and other plant parts).

The notebook will be assessed primarily by what it demonstrates about the student’s observations and understanding of plant structures examined during lab sessions, comprehension of guidance given for each session, and extra information and material-gathering done outside class sessions. Specific criteria for marking is:

i. Breadth of coverage (40% of mark): i.e. number of species included
ii. Depth of coverage (40% of mark): attention to detail, awareness of criteria for identification for individual species

iii. Additional information and material gathering (outside lab sessions) (10%) of mark (e.g. information or papers on seed morphology, seed quantification, taphonomic factors that influence changes to seed size/shape; etc).

iv. Overall notebook presentation including drawing quality of (10% of notebook mark), i.e. orderliness in notebook format and attention to detail in illustrations. Sketches of plant parts are expected to be highly schematic: marking is not based on 'artistic merit’ or drawing ability but rather on diagram readability, demonstration of technical knowledge and attention to detail (e.g., inclusion of a scale bar, visibility and labelling of parts, particularly diagnostic features). (Note: a session on drawing and measuring cereals will provide clarification, and handouts will be distributed with examples of sketches of plants/seeds.

NOTEBOOKS ARE TO BE HANDED IN ON THE DAY OF THE PRACTICAL EXAM (LATE MAY/FIRST WEEK OF JUNE (DATE TO BE CONFIRMED).

2. PRACTICAL EXAM ON KEY ECONOMIC SPECIES 40% WILL BE SCHEDULED FOR LATE MAY/EARLY JUNE (DATE TO BE CONFIRMED): Students are asked to identify (to Family/genus and/or species) specimens of key economic species and in some cases also required to give the type of plant fruit (e.g. achene, nut, caryopsis, drupe) and place of origin/domestication. The exam is in two parts: for Part 1, students may use their lab notebooks, handouts, etc. to help them with their identifications; and for Part 2 no hand-outs or notebook may be used. All items will be worth 2 or 3 points with partial credit awarded for incomplete identification (e.g. for higher taxonomic level identification, plant part identification). Practice quizzes (unassessed) will be given during the 1-week course to provide practice. Study specimens will be available for study in the lab in the weeks subsequent to the 1-week taught course, up to the day before the exam. The final exam will be scheduled for either the end of May or the beginning of June, the date will be posted on Moodle in advance.

The intended outcome is that, through the study of specific laboratory specimens, students will obtain skills in seed identification, which are transferable, i.e. can also be applied to the identification of taxa not examined here. Students will be able to recognise the salient morphological features of seeds of economically important Old World taxa that are commonly recovered from archaeological sites in the Europe and Asia.

3. WRITTEN ASSIGNMENT: 2,500 WORDS PLUS ILLUSTRATIONS. 50%. Due: 1 week after the exam. This assignment entails both laboratory and literature research. Students are expected to undertake a small comparative study of plants in a given taxonomic order (sensu Judd et al. 1999) of seeds, or groups of domesticates, and to prepare drawings, measurements and descriptions. Potential topics and taxa groupings are outlined below; it is expected that students in a particular academic session will do different topics from each other. (A topic sign-up sheet will be posted during the short course, Reading week Term II).

The aims of the assignment are to generate guidelines for the identification of specimens found in archaeological contexts, and to observe how species morphological features relate to evolutionary relationships such as phylogeny or domestications. The study should include a bare minimum of 15 taxa, such as five species representing each of 3 related families. (Nevertheless, the study of more than 15 taxa does not guarantee a higher mark; rather, this assignment calls for a comprehensive analysis of a minimum of 15 taxa.) Students should focus on identifiable morphological features of the relevant seeds/plant parts under study, bearing in mind that these features might be altered by charring and other taphonomic factors; comparisons should also consider the human use implications of the recovery of each taxon in archaeological assemblages (uses as food, medicine, and/or raw materials for making tools,
clothing, shelter, etc.), as well as botanical and environmental implications i.e. time of year flowering/fruiting and the biogeographic (or other environmental) zones it represents.

The written report should be approximately 2,500 words, including relevant background information, and suitably illustrated with drawings and/or photographs and charts and/or tables. All drawings, charts, tables and photographs should be properly captioned/titled. (Drawings, photographs and charts are captioned as "Figures" and placed below the image; "Table" captions are placed above the table.) Figure and Table numbers should follow sequentially and be indicated in the essay body. Drawings and photographs should include scale bars and appropriate labelling of plant/seed parts. When used properly, charts and tables are excellent tools for summarising data, particularly for comparisons, and because they included in the word count, can help keep within the word count.

The intended learning outcomes of this assignment are enhanced awareness and improved skills in the observation and documentation of information that is necessary for archaeobotanical identification and interpretation. Comparisons of related species help students to refine their identification skills and understand evolutionary relationships.

* Note: it is recommended that students begin working on the written assignment during Term II and over the Easter break, so that they can complete it before submission date to have ample time to review for the practical exam in early June, and to work on their dissertation. You are responsible for your own time management.

**PRACTICAL ESSAY TOPICS** A topic sign-up sheet will be posted during the short course, Reading week Term II.
1. Identification criteria, and comparative anatomy for seeds of the Caryophyllales, such as the families Caryophyllaceae, Portulaceae, Aizoaceae.
2. Identification criteria, and comparative anatomy for seeds of the Lamiales, such as the families Lamiaceae, Plantaginaceae, and Schrophulariaceae
3. Identification criteria, and comparative anatomy for seeds of the Apiaceae—looking at at least 5 tribes across this family, including some crop species
4. Identification criteria, and comparative anatomy for seeds of the Asteraceae—looking at at least 5 tribes across this family, including some crop species
5. Identification criteria, and comparative anatomy for seeds of the Euphorbiaceae looking at least 3 tribes across this family, including some crop species
6. Identification criteria, and comparative anatomy for seeds of the Liliales (and adjacent), including at least 3 families, such as Dioscoreaceae, Liliaceae, Melanthiaceae
7. Identification criteria, and comparative anatomy for seeds of the Sapindales, including at least the 4 following families, Rutaceae, Meliaceae, Sapindaceae, Anancardiaceae
8. Identification criteria, and comparative anatomy for nutlets of the Cyperaceae, including at least 5 tribes
9. Identification criteria, and comparative morphology and domestication traits in Chloridoideae grasses, including Eragrostidae at least 4 other tribes.
10. Identification criteria, and comparative morphology and domestication traits in Panicoid grasses, including Paniceae and Andropogonae tribes, some crops and non-crops.
11. Identification criteria, comparative morphology of grains and chaff in the Aveneae, Stipeae and a related tribe of grasses.
12. Identification criteria of the seeds and fruits of the Asian spice trade.

Other topics may be possible. If you have an idea for another topic, along these lines, please discuss it with Dorian.
RESOURCES

Libraries

In addition to the Library of the Institute of Archaeology, other libraries in UCL with holdings of particular relevance to this degree are: DMS Watson Science Library.

Archaeobotany & botany reference books housed in the IOA Archaeobotany lab:

There are also a certain number of useful reference books in the labs, both rooms 313 and 306. You are welcome to consult these. You may borrow them briefly for photocopying and scanning, but please return them to the shelf where you found them; these are references that are used by everyone using the lab, not just people on this course.

IOA Plant reference collections

For week to week teaching, learning and sample identification an open access seed reference collection is housed in Room 313. This includes an eclectic range of taxa. These are organized by taxonomic families arranged alphabetically. Far more extensive reference collections are available for European and Near Eastern seeds in the locked black cabinets along the wall in Room 313. These collections are ordered taxonomically, based on Flora of Turkey (for Near Eastern seeds), apart from grasses, which are arranged alphabetically by genus, with cereals being separated. Additional collections on Old World legumes and millets supplement these.

Further collections for South Asia, East Asia and Africa are still highly patchy but are gradually being expanded. In addition we have extensive reference collections for other kinds of plant materials. You will be introduced to these in this course. These include wood anatomy slides of Northern European, Near Eastern and South Indian woody plants, housed in Room 313, together a parenchyma slide collection (of Pacific and European tubers) and a starch grain collection (of Pacific tubers). There is also cleared leaf collection of British taxa. The Institute also has an extensive European pollen reference collection. A phytolith reference collection is also available for many Near Eastern and Asian grasses, and is also under development for additional taxa. Our starch grain reference collections are currently rudimentary, and mainly focused on Pacific tuber species. There are also large tubers and fruits of the Pacific and other regions.

REMINDER: It is expected that all participants will practice good standard laboratory practice. All reference material MUST be returned to its correct location in the collections so that others may consult it. Bench areas must be left clean: i.e. microscopes should be covered when not in use, glassware and other supplies should be washed and/or put away, the bench area wiped of any debris.

Hand-outs & web resources will be available for most topics, providing some background and useful guides to identification. As well as additional bibliography. Some of these are already available for download, others will be added in due course, the “Dorian Downloads pages”. This webpage also provides useful links to other web sources on archaeobotany, crops and plant taxonomy. http://www.homepages.ucl.ac.uk/~7Etnrdfu/archaeobotany.htm

This website can be easily located by following link from http://archaeobotany.googlepages.com/

For some publications by the course instructor, download from: http://www.homepages.ucl.ac.uk/%7Etnrdfu/downloads.htm

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 course. 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/field/placement work which will be undertaken as part of this course.

**LECTURES: CONTENT AND READINGS**

**LECTURE 1. Fruits, Seeds and seed-alikes: defining basic categories**

*Readings:*

**Percival, John** 1946 [or earlier editions!] *Agricultural Botany,* Eighth edition. Duckworth. Chapter 8. The Fruit [to be made available in class]

*Focus on the introductory parts of these chapters:*


Alternatively, read on these three families in another source such as Percival *Agricultural Botany;* Langer and Hill

Or **Heywood** *Flowering plants of the World* [in teaching collection 1905; BOTANY QUARTOS 84 g HEY]


✈ **HAND-OUT:** “A primer of cereals and grass inflorescence structure” (also downloadable).

**Activities:**
For this session you will be expected to examine and draw/sketch the follow taxa so as to familiarise yourself with their structures and identifiable differences between:
*Wheats (Triticum spp.), *Barley (Hordeum vulgare), *Rye (Secale cereale), *Rice (Oryza sativa), *Sorghum, ‘great millet’ (Sorghum bicolor), selected Millets (Panicum, Setaria, Echinochloa, Eleusine). Some of these taxa will be looked at in further detail in subsequent sessions on wheats, barley, and millets (See sessions 13 and 15, below).

**Lab manuals and principal readings**


**See also:**

**GEORGE WILLCOX on-line seed atlas for the Near East:**
[http://g.willcox.pagesperso-orange.fr/archaeobotanical%20images/index1.htm](http://g.willcox.pagesperso-orange.fr/archaeobotanical%20images/index1.htm)

**MARK NESBITT on-line papers on domestication and archaeobotany-cereals.**
General Background Reading On Grasses, Cereals & Cereal Domestication:


http://www.colorado.edu/eeb/MORPH/labs/pubs/kellogg_pubs.html]

http://www.colorado.edu/eeb/MORPH/labs/pubs/kellogg_pubs.html]


Cereal domestication


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

LECTURE 3. Overview of taxonomy, plant evolution & plant structure

- **HAND-OUT:** ‘road-map’ phylogeny

**Readings:**


**Classic Texts:**


**Further readings:**


Martin and Barkley 1961. *Seed Identification Manual*

Taylor, D. and Hickey, L. J. 1996. *Flowering plant origins, evolution and phylgenby.* Chapman and Hall. Chapters 6, 9, 10


LECTURE 4. Introduction to pulse identification (fabaceae/leguminoseae)

**Activity:** For this session you will be expected to examine and draw/sketch the follow taxa so as to familiarise yourself with their structures and identifiable differences between: *Pisum, Lens, Cicer, Lathyrus, Vicia, Vigna, Cajanus, Lupinus*

**Readings:**


Zohary and Hopf, Chap. 3.
**Additional readings**

Sections on Leguminoseae in **Heywood, Flowering Plants of the World** and/or **Hickey and King 100 Families of Flowering Plants**

**Butler, A. 1996.** *Trifolieae* and related seeds from archaeological contexts: problems in identification, *Vegetation History and Archaeobotany, Special Volume: Early Farming in the Old World* (ed. K.-E. Behre and K. Oeggl), pp. 157-168. *Why it is probably a waste of time to try to get these taxa down to species!*


**LECTURE 5.** Turning flowers into fruits: Examples of the Solanaceae, Rosaceae and Apioaceae

**Activities:** Draw the fruits of 2 Solanaceae (e.g. tomato, pepper, aubergine) and at least 3 Rosaceae (including a *Malus* or *Pyrus*, *Prunus*, and *Fragaria* or *Rubus*), labelling the fruit parts and indicating the floral structures they derive from. Examine also the internal anatomy of a solancae seed and 2 spp. of Rosaceae. Also pull apart and sketch an Umbellifer schizocarp (e.g. Cumin, coriander)

**Readings:**

**Percival, J. 1946** [or earlier editions!] *Agricultural Botany*, Eighth edition. Duckworth. Chapters 6-7 (The flower and the inflorescence and The Fruit); Chapters 30 (Rosaceae) and 33 (Solanaceae) [to be made available as photocopies]


Rosaceae and Solanaceae sections in **Heywood’s Flowering Plants of the World.** [in teaching collection 1905; BOTANY QUARTOS 84 g HEY]

Alternatively read the family descriptions in **Hickey and King’s 100 Families of Flowering Plants.**

**LECTURE 6 & labwork exercise:** Sorting flotation samples for seeds.

**Readings:**


LECTURE 7: an introduction to nuts:

- Introduction for Archaeological Nutters AND HANDBOOK to be provided that includes some bibliography.

Introductory readings


LECTURE 8. MONOCOTYLEDONS (Monocotyledoneae)

Flowering plants (Angiosperm) are classified into Monocotyledoneae and Dicotyledoneae. Monocotyledons (“Monocots”) are of importance for humans because they include many economically useful species. In this lecture we examine features of the Monocotyledoneae that distinguish them from Dicotyledoneae (“Dicots”).

- Handouts with some bibliography to be provided in class.

LECTURE 9. NUTLETS: POLYGONACEAE, CYPERACEAE AND RELATED GROUPS

- HAND-OUTS: will include Dorian’s simplified primer but have a look at the Sections on Polygonaceae and Cyperceae in Martin & Barkley (1946). Keeping in mind that the big genera as they used to be used, such as Polygonum and Scirpus, have been broken up and subdivided.

Readings:


On sedge taxonomy/phylogeny, see


LECTURE 10. AN INTRODUCTION TO OILSEED AND FIBRE CROPS

- Relevant sections in Percival Agricultural Botany; Robbins Botany of Crop Plants [to be made available as photocopies]

Readings:


Zohary and Hopf, Chapter 4

Langer and Hill 1991, Chapters 7 (Brassicaceae), 8 (Cannabinaceae) and 14 (Malvaceae)

See also the plant family sections in Heywood

Additional readings:


Readings on Umbellifer flavourings, Compositae oilseeds and related vegetables: Apioaceae and Asteraceae:


Robbins, G. 1931. Botany of Crop Plants, Third edition. Blakiston, Philadelphia. Chapters 35 (Umbelliferae) and 41 (Compositae) [Photocopy to be circulated]

Further reading:


Additional readings


Readings:
Plant family sections in Heywood, Flowering plants of the World
Judd et al. pp. 238 ff.

LECTURE 12. Sesame, flax, gourds & melons: Pedaliaceae, Linaceae, Cucurbitaceae

Readings:
Fuller, D. 2003 "Further Evidence on the Prehistory of Sesame" Asian Agri-History 7(2): 127-137 [Photocopy to be provided]
Langer and Hill 1991, Chapter 13 (Linaceae)
Zohary and Hopf, sections on Linum, Melons

Further readings:
See the chapters on Cucurbitaceae in the agricultural texts already cited for previous sessions.


- Hand-out: Dorian’s simplified primer handouts to be provided.

Activities: Look at how the rachis remains of wheat and especially barley are tabulated by morphotypes—indicating state of preservation and probably domestication status. An exemplary publication of such data.

Readings

The ‘bible’ of wheat identification is the manual of Stefanie Jacomet, available for PDF download in German or English: There is a link available on Dorian’s archaeobotanical resources page, or directly here: pages.unibas.ch/arch/archbot/pdf/index.html

See Zohary and Hopf 2000 or 2012, on Wheats and barley

More Readings:


[Note the interpretations of genetics in this paper are dodgy, but from the point of view of identification and archaeological distribution it is useful]


LECTURE 14 and labwork exercise: counting, drawing and measuring seeds

- Handout on measuring cereals will be provided.

Readings:


Charles, M., Forster, E., Wallace, M., Jones, G., 2015, «Nor ever lightning char they grain”: establishing archaeologically relevant charring conditions and their effect on glume wheat grain morphology», STAR Science and Technology in Archaeological Research 1, 1-6.
LECTURE 15. Cereal identification part 3. Focus is on millets and selected wild grasses.

- HAND-OUT: Dorian’s Millet Atlas (available for download).

**Readings:**

The following readings are additional to those Lectures 2 and 13 above.


Nesbitt, M. and Summers, G. D. 1988. Some recent discoveries of millet (Panicum miliaceum L.) and Setaria italica (L.) P. Beauv.) at excavations in Turkey and Iran, Anatolian Studies 38: 85-97


See also The Lost Crops of Africa I. Cereals. 1996. National Academy of Sciences (USA). [Can be read free on-line at books.nap.edu]

Further readings:


LECTURE 16. Discussion about crop-processing and review of cereals


Reddy, S. N. 1997. If the threshing floor could talk: integration of agriculture and pastoralism during the Late Harappan in Gujarat, India. *Journal of Anthropological Archaeology*, 16(2), 162-187.


LECTURE 17: Select group of common weeds: Brassicaceae, Small Legumes, Euphorbiaceae, Labiateae, Chenopodiaceae, Polygonaceae.

Brassicaceae Handout


APPENDIX A: BEYOND SEEDS

Further subjects: (not covered in the practical sessions): Below are some starting places for topics not directly addressed during the seed practical course here, but relating to the wider study of archaeobotany through other forms of plant remains.

To link to this article: http://dx.doi.org/10.1080/00438243.1993.9980230

**TUBERS, PARENCHYMA TISSUES AND NUTRIENT BIOAVAILABILITY STUDIES (Not covered during the practical sessions in this course.)**

Hather, J. 2000. Archaeological Parenchyma. Archetype Press, London. Especially Chaps. 1, 2, 4, 5, 6, 7. This chapters are all quite short and heavily illustrated. [INST ARCH BB 51 Qto HAT]


Heiser, C. B. 1990 [or earlier ed.] Seed to Civilization. Chapter 8 (Starchy Staples)


**PHYTOLITHS IN ARCHAEOLOGY (Not covered during the practical sessions in this course.)**


WOOD IDENTIFICATION/ WOOD CHARCOAL IN ARCHAEOLOGY (Not covered during the practical sessions in this course.)

*Readings that provide starting points.*


See the anatomical descriptions and illustrations of the following taxa: *Phoenix* (Gale and Cutler only 343-347, *Pinus, Quercus, Betula, Rhamnus*. An activity to try: Examine and sketch and note differences between 3 taxa from wood charcoal. These taxa may be chosen from the above list or others.

See also the following websites:

International Association of Wood Anatomists (IAWA) - website of the principal organisation for wood anatomists from around the world : URL: *http://www.iawa-website.org*. Current and past issues of the IAWA Journal are available from this site.
APPENDIX B: UCL POLICIES AND PROCEDURES 2016-17 (please read carefully)

This appendix provides a short précis of policies and procedures relating to courses. 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 following website:

http://wiki.ucl.ac.uk/display/archadmin

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/

INSTITUTE OF ARCHAEOLOGY COURSEWORK PROCEDURES

General policies and procedures concerning courses and coursework, including submission procedures, assessment criteria, and general resources, are available on the IoA website. 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 course co-ordinator.

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. Please note that these regulations have changed for the 2016-17 session.

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 Course Coordinators 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 Course 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 course on Moodle. For help with Moodle, please contact Tina Paphitis, Room 411a (t.paphitis).
-70-72% An answer which meets but does not exceed the basic requirements for a mark at distinction level and does not show evidence of any of the five outstanding attributes 1-5 listed above.

-73-76% A solid distinction level answer which clearly meets the requirements for a distinction mark and may also show evidence of one or two of the attributes 1-5 listed above.

-77-79% An exceptionally good piece of work which meets the requirements for a distinction level mark to an excellent degree and also shows evidence of several of the attributes 1-5 listed above.

-80% and above These marks will be used for outstanding work of exceptional originality and insight.

Marks above 85% will be uncommon. A mark of around 90-94% might be given to the best answer in a particular area over, say, a five to ten-year period, and a mark of around 95-98% for the best piece of work ever submitted on a topic, a piece of work that could hardly be bettered.

**Criteria for awarding a mark within the merit range (60-69%)**
To gain a mark of 60-69%, the answer will show a good understanding of the question; very few mistakes or misunderstandings; good structure and an argument that builds to a relevant conclusion; few if any irrelevancies; good analysis; clear logic; coherent argument; clear evidence of knowledge and reading of an appropriate range of sources; evidence of discrimination between relative value of different sources; some originality in selection of sources; some reading beyond the reading list; good awareness of evidence bearing on the question; good use and selection of appropriate case studies or examples; some judgment in weighing and assessing different lines of evidence; good writing displaying clarity and few errors of spelling, grammar, punctuation; few inaccuracies in bibliography and citation of references; good critical reflection; a critical approach to assumptions of other writers; some attempt to recognize and evaluate own assumptions; some evidence of independent thinking in evaluation of evidence / interpretation; some original insight; some indication of awareness of unresolved issues in the discipline as a whole; partially successful attempts to relate argument to core concepts in general archaeological method and / or theory; good reasoning from problem to methods to data; some indication of a statement / understanding of a research problem; some indication of selection of appropriate methods for the problem or selection of appropriate data; some defence of methods chosen.

**Criteria for awarding a mark within the pass range (50-59%)**
To gain a mark of 50-59%, the answer will show evidence of relevant knowledge and a general understanding of the question. There will be indications that the student has grasped at least some of the fundamental concepts relevant to the field of the degree. There should normally be at least a little evidence of some form of originality, for example in the application of knowledge or in the way the question is addressed. There may be some failings in demonstrated understanding but overall the work will be at least reasonably competent and sound.

If, however, the answer shows the following failings it will not normally achieve a mark higher than 59%: some mistakes or misunderstandings; some failings in structure (e.g. some irrelevancies, limited analysis, imperfect logic, lapses in coherence); little development of ideas and methods, inadequate evidence of knowledge or reading of an appropriate range of sources; limited evidence of discrimination between relative value of different sources; little or no originality in selection of sources; little or no reading beyond the reading list; limited awareness of evidence bearing on the question; little or no reference to appropriate case studies or examples; limited judgment (if any) in weighing and assessing different lines of evidence; mediocre writing (lapses in clarity, some errors of spelling, grammar, punctuation); some inaccuracies in bibliography and citation of references; limited critical reflection; limited evidence of a critical approach to assumptions of other writers; little or no indication of an ability to recognize and evaluate own assumptions; little evidence of independent thinking in evaluation of evidence / interpretation; little original insight; little or
no indication of awareness of unresolved issues in the discipline as a whole; limited attempts to relate argument to core concepts in general archaeological method and/or theory; limited reasoning from problem to methods to data; little or no clear statement/understanding of a research problem or question; little or no indication of selection of appropriate methods for the problem or selection of appropriate data; little or no defence of methods chosen.

Criteria for awarding a mark within the fail range can be found at: https://wiki.ucl.ac.uk/pages/viewpage.action?pageId=43650568