ARCL0094
Geographic Information Systems in Archaeology and History and History

2019–2020

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Deadlines for coursework for this module:
11/11/2019; 04/12/2019; 13/12/2019; 13/01/2020 (essay)

Target dates for return of marked coursework to students:
30/11/2019; 13/01/2020; 13/01/2020; 03/02/2020 (essay)
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This document and other resources are available from the module website:
https://moodle-1819.ucl.ac.uk/course/view.php?id=326
1 Overview

1.1 Short description

This module explores both the theoretical issues and practical methods associated with using Geographical Information Systems (GIS) for archaeological and historical research. This handbook contains information about the content and administration of the module. Queries about its objectives, structure, content, assessment or organisation should be directed to the Module Co-ordinator. Additional resources pertaining to this module in particular can be found on the module’s Moodle pages (https://moodle-1819.ucl.ac.uk/course/view.php?id=326). Further general information can be found at http://www.ucl.ac.uk/archaeology/handbook/common/ and in the general MA/MSC handbook. It is your responsibility to read and act upon this information, which relates to originality, submission and grading of coursework; disabilities; communication; attendance; and feedback.

1.2 Week-by-week summary

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<tr>
<th>Week</th>
<th>Date</th>
<th>Session</th>
<th>Subject</th>
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<td>A Rough Guide to GIS</td>
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<td>Data Structures and Geodesy</td>
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<td>16 Oct</td>
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<td>Vector Data: Acquisition and Manipulation</td>
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<td>Operations for Vector Data</td>
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<td>Raster Data: Acquisition and Manipulation</td>
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<td>Reading week</td>
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<td>Operations for Raster Data</td>
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<td>8</td>
<td>20 Nov</td>
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<td>Analysing Patterns in Spatial Data</td>
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<td>27 Nov</td>
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<td>Advanced Vector and Raster Functions</td>
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<td>10</td>
<td>4 Dec</td>
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<td>Maps and Digital Cartography</td>
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<tr>
<td>11</td>
<td>11 Dec</td>
<td>10</td>
<td>Review and Prospect</td>
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1.3 Basic texts


Bevan, A.H. & Lake, M. (Eds.) 2013. *Computational Approaches to Archaeological Spaces*. Walnut Creek, US: Left Coast Press. [INST ARCH AK 30 BEV]


1.4 Methods of assessment

This module is assessed on the basis of two pieces of coursework: (i) a project, consisting of three individual practical assessments, the sum of which contribute 50% to your final grade; (ii) a written essay, no more than 3000 words in length, also worth 50% of your final mark. The topics and deadlines for each assessment are specified below. If you are unclear about the nature of an assignment, they should contact me. I will be willing to discuss an outline of your approach to the assessment, provided this is planned suitably in advance of the submission date.

1.5 Teaching methods

The module is taught by a mixture of lectures, practical sessions and group discussion. Students will be expected to have done the necessary tutorial revision in order to continue to follow the practical session in class and to contribute actively to discussion.

1.6 Workload

There will be 20 hours of dedicated lectures and practicals for this module, and students are expected to undertake around 70 hours of tutorial revision and further reading for the module, plus 60 hours preparing for and producing the assessed work. This adds up to a total workload of approximately 150 hours.

1.7 Prerequisites

There are no formal prerequisites for this module.

2 Aims, objectives and assessment

2.1 Aims

The module aims to provide an:

- an introduction to the principles of archaeological and historical GIS and
- an introduction to the fundamentals of GIS
- an insight into the ways GIS is applied in archaeology and history
- a practical awareness of the the techniques use to acquire, manage and visualise spatial data
- a familiarity with a range of computer software, particularly ArcGIS
- a grounding for those wishing to take the more advanced GIS Approaches to Past Landscapes (ARCL0095) module
2.2 Objectives

On successful completion of this module a student:

- understand the theoretical implications that GIS and spatial analysis bring to archaeology as analytical and interpretative aids,
- be familiar with ArcGIS and ArcInfoWorkstation
- be able to navigate spatial data and build a GIS Project
- construct effective spatial and attribute queries
- be familiar with data generalisation and statistical pattern recognition
- be able to digitise vector datasets and conduct raster interpolations (e.g. DEMs)
- be familiar with viewsheds and distance functions
- construct effective map layouts

2.3 Learning outcomes

In meeting these objectives you will also be able to demonstrate the following generic learning outcomes:

- an understanding of the core principles of GIS;
- the ways in which spatial data can be acquired and properly structured within a GIS system;
- the appropriate ways of visualising spatial data, and
- an awareness and some practical experience of the range of analytical possibilities GIS offers for interpreting archaeological spatial data.

2.4 Coursework

2.4.1 Assessment tasks

This module is assessed entirely via a notebook of practical work and an essay. The notebook involves three separate practical tasks whose deadlines will be roughly at fortnightly intervals throughout the term:

- Project construction. Using the downloaded topographic and archaeological survey files, edit them for use in GIS using ArcMap. Then create an appropriately structured ArcMap document using the edited data.
- Basic analysis. Establish what patterning there is, if any in the distribution of archaeological sites in the study region.
- Presentation. Produce a series of appropriately edited maps displaying the archaeological and topographic features of the study area.
The essay due on Monday, January 13th, 2020. It should strictly be between 2,850 and 3,150 in length. 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, students may be permitted, in advance of the deadline, to submit for comment a brief outline of the assignment. The Module Co-ordinator is willing to discuss an outline of the student’s approach to the assignment, provided this is planned suitably in advance of the submission date. The suggested essay topics are:

- What types of data structure are necessary for a large cultural resource management project such as a sites and monuments (or heritage environment) record. Please consider both desktop and online provisions, as well as issues of data interoperability. If you are unsure what a sites and monuments (or heritage environment) record is, then please ask.

- Discuss ONE aspect of GIS-led analysis that you think will have the most impact on archaeology in the next decade. Explain why its potential has NOT yet been realised fully and make sure to discuss what future efforts are necessary to develop it more effectively.

- ‘GIS is only useful to archaeology as a means of managing spatial data and identifying spatial patterns; it cannot, on its own, be used to explain past environmental processes or explain cultural behaviours’. Discuss whether you agree or disagree with this statement and why.

2.4.2 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.

Penalties will only be imposed if you exceed the upper figure in the word count 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 2019-20 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.

2.4.3 Coursework submission procedures

- All coursework must normally be submitted both as hard copy and electronically unless instructed otherwise (However, 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. **Please note that the procedure has changed for 2019-20, and work is now submitted to Turnitin via Moodle.**

1. Ensure that your essay or other item of coursework has been saved as a Word doc., docx. or PDF document. Please include the module code and your candidate number on every page as a header.

2. Go into the Moodle page for the module to which you wish to submit your work.

3. Click on the correct assignment (e.g. Essay 1),

4. 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 Essay 1), Note that this changes each year.

5. Click “Upload”.

6. Click on “Submit”

7. You should receive a receipt – please save this.

8. If you have problems, please email the IoA Turnitin Advisers on ioa-turnitin@ucl.ac.uk, explaining the nature of the problem and the exact module and assignment involved. One of the Turnitin Advisers 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 Advisers they will be able to notify the relevant Module Coordinator that you had attempted to submit the work before the deadline.

3  **Schedule and syllabus**

3.1 **Teaching schedule**

The module will be taught in Term 1 and classes will be held from 9-12pm on Wednesday in cluster room 501 of the Institute of Archaeology.

3.2 **Practical Groups**

Students following this module attend as a single group for the module lectures from 9-10am and then typically split into two groups for practical sessions that run over the following two hours. Further details about the arrangements for practical sessions will be provided at the first session.

3.3 **Detailed week-by-week syllabus**

The syllabus below provides a short summary of the main themes covered in each weekly session as well as a range of preliminary readings. The module places an emphasis on applied skills and hence, in addition to the general and weekly readings, students are also expected to work through four module tutorials designed to reinforce the skills learnt in class.
Session 1: A Rough Guide to GIS

This first week offers an introduction to GIS, including its history as a technique and discipline, its achievements so far and its current role in archaeology.

**Practical**  Introduction to ArcGIS, navigation, basic data manipulation.

**Essential reading**


Session 2: Data Structures and Geodesy

We consider more of the basic principles underlying the use of GIS, concentrating on the types of data model currently used to describe spatial phenomena. We then explore the importance of geodesy and geographic coordinate systems.

**Practical**  Moving between coordinate systems. Introduction to the Kythera dataset and to vector data models. Building ArcGIS projects. Principles for manipulating symbology.

**Essential reading**


Session 3: Vector Data: Acquisition and Manipulation

We focus more closely on one type of data model (vector), exploring its main advantages, disadvantages, how it is acquired and the contexts in which it is most commonly used.

**Practical**  Heads-up and tablet digitising, attribute editing, data cleaning, metadata
Essential reading


Bell, T. and Bevan, A. 2004 *A Survey of GIS Standards for the English Archaeological Record Community*, Report Commissioned by English Heritage. URL: [http://discovery.ucl.ac.uk/149398/](http://discovery.ucl.ac.uk/149398/) (For now, read mainly for the long tradition of preferring vector datasets in UK archaeological records)


Session 4: Operations for Vector Data

We explore how to go about asking interesting questions of information recorded in a GIS, particularly using vector data. In particular, we consider the great possibilities created by the combination of spatial and aspatial queries. Data generalisation is a related topic addressing the formal means by which we summarise, present and make sense of complex datasets.

Practical Importing spreadsheet data, one-to-one attribute joins, spatial joins, many-to-one relations, attribute and spatial queries.

Essential reading


Session 5: Raster Data: Acquisition and Manipulation

We focus more closely on raster data models, addressing how they are acquired and their contrasting strengths and weaknesses when compared to vector data.

Practical DEMs and derivative surfaces.

Essential reading


**Session 6: Operations for Raster Data**

Raster data can be a particularly powerful way of approaching spatial questions because of its support for a range of arithmetic, boolean, relational and zonal operators. We consider how such procedures have been used within GIS applications both in general and with particular regard to archaeological research.

**Practical** Map algebra, neighbourhood statistics, filtering, histograms

**Essential reading**


**Session 7: Analysing Patterns in Spatial Data**

The formal analysis of spatial patterns is one of the great strengths of GIS, but one often ignored in the rush for more flashy GIS functionality. Here we consider the types of statistical treatment often used on zonal and point data, as well as the special treatment required for spatial data, which is often not provided by classical statistical models.

**Practical** Point pattern analysis, data export to spreadsheet packages, chi-square tests and statistical charts.

**Essential reading**


Bevan, A. 2002 ’The Rural Landscape of Neopalatial Kythera: a GIS perspective’, *Journal of Mediterranean Archaeology* 15.2: 217-256. (already a bit dated, but an introduction to the part of the Greek island of Kythera that is considered in the third practical assessment and to some examples of landscape-scale pattern analysis) [IoA Pers, or from me directly]

Orton, C. 2000 Sampling in Archaeology, Cambridge: Cambridge University Press. (Read early chapters for a view of spatial sampling and its importance). [INST ARCH AK 10 ORT]
Session 8: Advanced Vector and Raster Functions

This week tackles more advanced aspects of route- and region-based modelling, offering an introduction to topics such as hydrological models, viewshed analysis and cost surfaces that are treated in greater detail in the companion module GIS2 (ARCL0095).

Practical  An introduction to viewshed analysis, cost surfaces and least cost paths.

Essential reading


Session 9: Maps and Digital Cartography

This week we consider the role of cartography in recent human history, the principles behind modern maps, and the implications of new technologies such as internet-based map servers and collaborative mapping.

Practical  The process of producing map layouts for printing or still digital capture, according to proper cartographic principles. Also the incorporation of 3D views.

Essential reading


Dent, B.D. 2009 Cartography: Thematic Map Design, London: McGraw-Hill. [INST ARCH ISSUE DESK; GEOGRAPHY QUARTOS D 40 DEN] (Worth browsing several of the chapters for the main issues)


Session 10: Review and Prospect

The final week is an opportunity to review the topics covered by the module and also offers a chance to discuss in more detail some concrete strategies for addressing particular archaeological questions using GIS. We also discuss the future of GIS within the discipline of archaeology. There are no required readings, but students are encouraged to ask the coordinator for further reading on specific topics either ahead of or during the session.
Practical  Review of practical skills based on a series of typical GIS workflows in archaeology.

4 Online resources

The full UCL Institute of Archaeology coursework guidelines are given here: http://www.ucl.ac.uk/archaeology/handbook/common/. The full text of this handbook is available here (includes clickable links to Moodle and online reading lists if applicable) http://www.ucl.ac.uk/silva/archaeology/course-info/ and on the module website: https://moodle-1819.ucl.ac.uk/course/view.php?id=326.

5 Additional information

5.1 Libraries and other resources

In addition to the Library of the Institute of Archaeology (5th floor), other libraries in UCL with holdings of particular relevance to this module are the Science Library (D.M.S. Watson building on the central UCL site) and the Environmental Studies Library in Wates House on Gordon Street. You may also wish to consult the list of electronic journals available through UCL (http://metalib-a.lib.ucl.ac.uk:8331/V?func=find-ej-1). A full list of UCL libraries and their opening hours is provided at http://www.ucl.ac.uk/library/.

The University of London Senate House Library (http://www.ull.ac.uk/) also has holdings which may be relevant to this module.

5.2 Attendance

A register will be taken at each class. If you are unable to attend a class, please notify the lecturer by email. Departments are required to report each student’s attendance to UCL Registry at frequent intervals throughout each term. Students are expected to attend at least 70% of classes.

5.3 Information for intercollegiate and interdepartmental students

Students enrolled in Departments outside the Institute of Archaeology should collect hard copy of the Institute’s coursework guidelines from the Academic Administrator’s office (Room 411A).

5.4 Dyslexia

If you have dyslexia or any other disability, please make your lecturers aware of this. Please discuss with your lecturers whether there is any way in which they can help you. Students with dyslexia are reminded to indicate this on each piece of coursework.

5.5 Feedback

In trying to make this module as effective as possible, we welcome feedback from students during the course of the year. All students are asked to give their views on the module in an anonymous questionnaire which will be circulated at one of the last sessions of the module. These questionnaires are taken seriously and help the Module Co-ordinator to develop the module. The summarised responses are considered by the Institute’s Staff-Student Consultative Committee, Teaching Committee, and by the Faculty Teaching Committee.
If you are concerned about any aspect of this module we hope you will feel able to talk to the Module Co-ordinator, but if you feel this is not appropriate, you should consult your Personal Tutor, the Academic Administrator (Judy Medrington), or the Chair of Teaching Committee (Dr. Bill Sillar).

5.6 Health and safety

Students enrolled on this module are particularly reminded of the measures that should be taken to reduce possible discomfort arising from the extended use of computer workstations. See the advice provided on the web at [http://www.ucl.ac.uk/efd/safety_services_www/guidance/dse/index.htm](http://www.ucl.ac.uk/efd/safety_services_www/guidance/dse/index.htm).

5.7 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: at [https://moodle.ucl.ac.uk/](https://moodle.ucl.ac.uk/). 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.

5.8 Granting of Extensions

Note that there are strict UCL-wide regulations with regard to the granting of extensions for coursework. Note that Module Coordinators are not permitted to grant extensions. All requests for extensions must be submitted on a 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 at [http://www.ucl.ac.uk/srs/academic-manual/c4/extenuating-circumstances/](http://www.ucl.ac.uk/srs/academic-manual/c4/extenuating-circumstances/)