

# **BIRKBECK, UNIVERSITY OF LONDON**

## **Department of Earth and Planetary Sciences**

### **BSc Planetary Science with Astronomy**

### **60-Credit Project Guidelines (SCES016D6)**

**2017/18**

This booklet gives general guidance relevant to the undergraduate project that forms a major part of the B.Sc. Degree in Planetary Science with Astronomy. Every project is different and students should consult their supervisors for specific guidance. The work you hand in for this module will be closely scrutinized by both the internal and external examiners. It may form the basis for discussions in your oral examination and, therefore, should be one of the best pieces of work that you produce during your degree. If you take a pride in this piece of work and attempt to shine, then this will stand you in good stead in terms of your final degree.

#### **SAFETY**

Depending on the project, you may be required to undertake hazardous procedures in a laboratory, such as sample preparation. Students must follow the advice of their supervisor or other authorized person in the laboratory at all times. **All laboratories are subject to COSHH regulations.** You must wear protective equipment or clothing if instructed to do so. Further information regarding safety in laboratories can be obtained from Dr. Andy Beard, who is the Department's Safety Officer.

#### **DUTIES OF SUPERVISORS**

Your Project Supervisor is jointly responsible with you for the selection of a suitable project. Your supervisor (or a laboratory manager or a member of the technical staff) will show you how to use appropriate equipment and/or software. It is your supervisor's job to supply advice, at mutually convenient times, on all aspects of your project.

#### **COURSE REQUIREMENTS**

The structure of the 'Planetary Science with Astronomy' project was modified in October 2013 to allow it to run over two academic years and to increase its value from 30 to 60 credits. The Project will now consist of the following elements:

- (a) A 5000 word literature review, progress report and a plan for the second year of the Project. This work will be assessed and will be worth 25% of the total project mark. It must be handed in by the end of the second (Spring) term of your penultimate year of study

(usually the second year for full-time students and the third year for part-time students). Marks and feedback on this element of the project will be provided by the end the Summer Term.

- (b) A detailed report, of no more than 15,000 words, must be completed and submitted by the end of the second (Spring) term of your final academic year (usually the third year for full-time students and the fourth year for part-time students). This will be assessed and will count for 60% of the total project mark. The preparation of the Project report will take more time than you expect, so it is wise to start writing it early, preferably in the autumn term of your final year. Some guidelines for the structure of this Report are given below.
- (c) Students are also required to give a 20 minute presentation describing their work to fellow students and interested members of the Department. This presentation will be assessed and will count for 15% of the final project mark. It will usually be given towards the beginning (usually within the first two weeks) of the third (Summer) term of your final academic year.

After submission of the literature review and progress report at the end of the Spring term of the first year of the project it is intended that work on the project will pause in the Summer term (to allow for revision and exams), but that it will resume during the summer vacation (which is when the Geology students will be doing their fieldwork).

## **PROJECT TOPICS**

Almost any topic in the Planetary Sciences, Earth Sciences, Astronomy, or Astrobiology will in principle be suitable for a project. However, for any proposed project it is essential that a suitable supervisor be identified, and that the supervisor judges that the proposed work is suitable for an undergraduate project. Students are encouraged to identify areas of science that interest them, and approach potential supervisors, during the Autumn Term of their penultimate academic year (usually the second year for full-time students and the third year for part-time students) with a view to identifying a project and supervisor by the end of the Autumn Term.

Any Birkbeck member of staff may act as a project supervisor, but staff with particular interests in planetary science and astronomy, and the subject areas they could supervise, are listed below. Feel free to approach several members of staff and talk to them about possible projects before finally deciding on one.

**Dr Andy Beard:** Meteorites; Evidence for ancient meteorite impacts in Scotland

**Prof Charlie Bristow:** Titan

**Prof Ian Crawford:** Lunar science; Astronomy; Astrobiology

**Prof Hilary Downes:** Meteorites; Extraterrestrial petrology; Volcanism; Xenoliths

**Dr Simon Drake:** Evidence for ancient meteorite impacts in Scotland

**Dr James Hammond:** Planetary geophysics

**Dr Phil Hopley:** Human evolution (with astrobiological implications)

**Dr Eleanor Jennings:** Magmatic processes; Planetary formation and differentiation

**Prof Gerald Roberts:** Mars; Planetary faulting/tectonics; Planetary geological mapping

**Dr Philip Von Strandmann:** Evolution of Earth's atmosphere with reference to past habitability (and possible astrobiological implications)

**Dr Charlie Underwood:** Invertebrate and vertebrate palaeontology (with or without astrobiological implications!)

**New Planetary Science Lecturer:** TBD (topics should be known by mid-November)

## **APPENDIX**

### **STRUCTURE AND PRESENTATION OF THE DIFFERENT PROJECT ELEMENTS**

#### **LITERATURE REVIEW AND PROGRESS REPORT (25%)**

The structure of the literature review and progress report due at the end of the Spring term of the first year of the project can be flexible, but it should contain at least three elements:

- (a) A review of the scientific literature relevant to the research topic chosen for the project. This should demonstrate familiarity with the available literature and should amount to about 50% of this element of the project.
- (b) A progress report on work undertaken so far, with preliminary results if available. This should amount to about 30% of this element of the project.
- (c) A detailed plan of activities to be conducted during the second year of the project. This should amount to about 20% of this element of the Project.

The total length should be about 5000 words. The relative weighting of the components given above is for guidance only, and supervisors and markers are free to exercise discretion (bearing in mind that the nature of some projects may not permit the generation of preliminary results by the end of this stage).

#### **ORAL PRESENTATION (15%)**

Your presentation will be given towards the beginning of the Summer term of your final academic year. It should be based around Powerpoint slides (or equivalent) and should be aimed at a general scientific audience not familiar with details of your specific project. It should last for about 20 minutes and should aim to give both an introduction to the topic for non-specialists and a summary of your main results. Your supervisor will help you with choosing the content and advise on presentation skills if required.

#### **FINAL PROJECT REPORT (60%)**

The project report should be produced and presented un-bound as it will be bound by the Department. It is advisable for you to keep a copy of your project report for your own reference prior to the oral examinations etc. At the time of submission, you should hand in your laboratory

notebook (if appropriate) and your report, with appendices containing tables of data that you have collected. The project length should be no more than 15,000 words and include diagrams, tables, photos, appendices etc (as appropriate).

Your project report should provide a clear, complete and understandable explanation of your project research work and the results. It should first and foremost be a scientific document and your aim is to be clear and concise. The project report should be written on A4 paper in double spaced typescript, with a font that is similar in size to this printed page (12pt). Text should appear on only one side of the paper and you should leave a 4 cm margin on the left hand side and 2 cm margin on the right. Every page in the project report should be numbered. The text of your project report must not exceed 15000 words in length. The purpose of the report is to summarise, describe and interpret the observations and analysis that you have performed. Since there is a 15000 word limit it may not be possible to describe all the data that you have obtained and therefore it is necessary to systematise and summarise, and to use diagrams, tables and photographs to avoid unnecessary descriptions. To some extent the organisation of a report will vary according to the topic of study.

The structure of the main text of your report will vary according to the topic of the project and must be discussed with your supervisor early in the progress of your research. However, the table of contents below can be used as a general guide. The information should be presented in a logical order, as set out below.

<b>TABLE OF CONTENTS</b>	<b>Page nos.</b>
<b>Declaration.</b>	i
<b>Table of Contents</b>	ii
<b>List of Figures</b>	iii
<b>Abstract.</b>	iv
<b>Chapter 1 Introduction (to include Aims and Objectives)</b>	1
<b>Chapter 2 Context</b>	?
<b>Chapter 3 Methods and Materials</b>	?
<b>Chapter 4 Results</b>	?
<b>Chapter 5 Discussion</b>	?
<b>Chapter 6 Conclusions and Recommendations for Further Work</b>	?
<b>References</b>	?
<b>Acknowledgements</b>	?
<b>Appendices</b>	?

With sub-sections, the following numbering systems should be adopted:

1. first order headings used for major chapters (e.g. Chapter 5 Results);
- 1.2. second order headings for main sections (e.g. 4.2 XRD methodology);
- 1.1.1. third order headings for sub sections (e.g. 5.1.3 Olivine compositions).

### **Subject Matter for each section**

*Declaration.* Your project report must contain a declaration that it is your own work (see note below on plagiarism). A suitable declaration is as follows:

The content of this project report is the original work of the author and has not previously been submitted for a degree at this or any other University. Other people's work is acknowledged by reference.

Typed name & signature:

Date:

School:

Birkbeck College, University of London.

*Table of Contents-* This should list the layout of your project report.

*List of Figures-* These are best numbered sequentially within each chapter (i.e. Figure 1.1, 1.2.... 3.5 etc), in case you need to add or remove one later.

*Abstract-* This should be no more than one side of A4 and should summarize your findings in no more than 300 words. If in doubt read some scientific journal papers to give you examples of abstracts.

### *Chapter 1. Introduction*

The introduction is one of the most important parts of any document. It should explain clearly the purpose of the document and prepare the reader for what is to come. A good introduction should include the following:

- (a) A clear statement of the nature of the project (what is being carried out);
- (b) The location(s) where the project has been undertaken (if appropriate);
- (c) An introduction to the key problems/issues being tackled and why these are important. You are putting the work into some sort of context, and therefore you need to set the scene for the reader and clearly explain the point of carrying out the work (i.e., its rationale). Every project should have a well thought out purpose, which should have been identified through discussion with your supervisor at the outset.

At the end of the Introduction chapter you should include a statement of the aims and objectives of the project. These should clearly outline any research questions, competing hypotheses or models that you wish to test, for example:

- (a) If there are competing hypotheses that you have set out to test, this section can be used to present them;
- (b) If the study is comparative with earlier work (e.g. same area/different method, or different area/same method) you could explain how your study is different from previous studies and why the different approach could lead to different results;
- (c) If there is a gap in the current state of knowledge, which poses a set of new questions, you might want to describe how you intend to fill or exploit that gap in knowledge.

### *Chapter 2. Context*

The title of this section will vary with the nature of the topic under investigation but it should aim to give more detail and place the subject of the project in its proper context. This section should aim to contain any information on the following:

- (a) Historical background to the issue(s) being investigated;
- (b) A summary of the current state of knowledge of the area/topic involved;
- (c) The nature of any controversies or opposing interpretations arising from existing research.
- (d) An account of relevant theory and methods of investigation.

Note that while some of this background material will have been covered in the 'Literature Review and Progress Report' submitted previously, it is important that this chapter is not just cut and pasted from that earlier work – you cannot be marked twice for the same words! Moreover, having worked for almost a year on your project since the submission of the original Literature Review you will (hopefully!) have studied many more relevant background papers and developed new perspectives. Note also that this chapter must not merely be an encyclopedia of other people's work, but rather should attempt to interpret and draw conclusions about the current state of knowledge. It should therefore aim to provide a concise summary of the field covered by your project as it stands at the time of completion, rather than be a re-hash of your original Literature Review.

### *Chapter 3. Materials and Methods*

In this chapter you have the opportunity to describe to the reader exactly how the data for the project were acquired. For these reasons, writing a methodology is often like writing a recipe. Make sure everything is clearly explained and described so that someone else would be able to repeat the exercise. It should be as concise a description as possible of the overall approach, the samples you collected, the sampling and the analytical methods, equipment, computer programs, etc. used to generate the data. Remember, though, that 'concise' does not mean 'insufficient'. The

material should follow a logical sequence, for example the order in which this work was done or the ranking of techniques employed in order of importance.

Remember that the Methods and Materials chapter should link clearly with the aims and objectives defined in your Introduction chapter. The former should clearly explain how you set out to achieve the intended aims and objectives by the methods and materials you used.

#### *Chapter 4. Results*

This is an account of your observations and/or data collected, including descriptions of laboratory work. The objective is to present the results obtained in a way that is acceptable as evidence to the reader. This can usually be best achieved by presenting the data mainly in Tables and Figures, with the necessary minimum of verbal explanation. It may be appropriate, if you have a lot of data, to summarise them in tables in Appendices at the back of your Project, but to describe the data in the text in this Results Chapter.

This section might give a brief resume of some or all of the following:

- (a) How many samples were analysed and how many measurements taken;
- (b) The coverage and quality of the data;
- (c) The nature of the measurements and how they differed between samples;
- (d) Details of documentary or other secondary data sources investigated.

#### *Chapter 5. Discussion*

In this chapter the results presented in the Results Chapter should be drawn together and discussed in relation to previously published data, giving information on the advances made and presenting conclusions. Speculation about results obtained in relation to other known facts may also be useful. In addition, you should discuss the possible theoretical or practical significance of your results. The purpose is to bring the various findings together in an interpretative manner. The discussion is often the most difficult part of a project to write and you should bear in mind that repetition to emphasise a point usually serves to labour it and often detracts from clarity.

#### *Chapter 6. Conclusions and Recommendations for Further Work*

This section should consist of a concise recapitulation of the objectives, results obtained and conclusions and possible future research objectives. However, care should be taken to avoid repeating verbatim the Abstract or material already presented in the Discussion chapter.

*References.* All cited references should be listed here in full. The list should be in alphabetical order and should conform to the style of a major international journal, such as *Icarus* or *Planetary and Space Science*.



*Acknowledgements.* These should include thanks to people (staff and students alike) who have helped you with your project, sources of funding (if any), etc.

*Appendices.* These should be listed as Appendix 1, Appendix 2, etc. and may include tables of data collected, or computer codes written, during the course of your project.

## **Figures**

In general, try to illustrate your report as fully as possible. Images, graphs, histograms and summary diagrams will improve your report. Remember to include scale and geographical coordinates where necessary and always label diagrams as clearly as possible. Good illustrations with informative and concise captions save words in the main text, and are often more helpful to the reader than long descriptions. Text within the diagrams looks much better if it is computer-generated. Images should be carefully chosen to illustrate specific points, not simply to make the report look pretty. If photographs are used they must include a scale and a comprehensive caption.

## **Tables**

Tables should be clearly numbered and have a clear caption relevant to their content. Tables should be included in the body of the text. Large quantities of data, such as 'raw' statistical output, should not normally be placed in tables in the text but should be placed in an appendix.

## **Plagiarism**

You are reminded that all work submitted as part of the requirements for any examination of the University of London must be expressed in your own words and incorporate your own ideas and judgements. Plagiarism - that is, the presentation of another person's thoughts or words as though they were your own - must be avoided. Direct quotations from the published or unpublished work of others must always be identified as such by using quotation marks, and a full reference to their source must be provided in the proper form. Remember that a series of short quotations from several different sources, if not clearly identified as such, constitutes plagiarism just as much as does a single un-acknowledged long quotation from a single source. Equally, if you summarise another person's ideas or judgements, you must refer to that person in your text, and include the work referred to in your reference list. Failure to observe these rules may result in allegation of cheating. You should therefore consult your tutor if you are in any doubt about what is permissible. In general, keep quotations from published works to a minimum. The examiner is trying to judge your contributions, not those of other authors.