

**School of Physics and  
Astronomy**



# **Astronomy**

## **2009/2010**

**Course Information:**  
**Discovering Astronomy S: Stars and Planets**  
**Astronomy 1G: Galactic and Cosmological Science**

September 2009

# ASTRONOMY COURSES 2009-2010

**This booklet contains important information about your course; please read it carefully, then keep it with your notes so that you can refer to it as the course progresses.**

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**The course web page can be accessed by registered students through the MyEd portal:**

**[www.myed.ed.ac.uk](http://www.myed.ed.ac.uk)**

Revision Sept 2009

The Course Organiser has tried to ensure that information given in this booklet is correct at the time of printing. Any alterations or amendments that prove necessary will be notified through the course web pages and posted on the Astronomy 1 notice board in the Appleton Tower concourse.

W.K.M. Rice

## Course Structure

*Astronomy 1G: Galactic and Cosmological Science* is aimed at scientists, and is recommended, for example, to be taken by those students registered for Astrophysics. It concentrates on the physics and appearance of galaxies and our current understanding of the universe that we inhabit.

*Discovering Astronomy S: Stars and Planets* is accessible to students taking a variety of courses. It is an introduction to the Solar System and the Milky Way galaxy, and to other star systems.

In the 2010/2011 academic year, the courses offered will be:

*Astronomy 1S: Stellar and Planetary Science* is aimed at scientists and is recommended, for example, to be taken by those students registered for Astrophysics. It concentrates on the physics and life story of stars and planets and how this illuminates our understanding of the Universe.

*Discovering Astronomy G: Galaxies and cosmology* is accessible to students taking a variety of courses. It is an introduction to the concepts and methods used by astronomers and discusses what, as a consequence, we know about our universe.

Each of these courses is designed in its own right to be exciting, up to date, and a rounded introduction to the ideas, methods and results of astronomy, taught by staff actively engaged at these frontiers. The Astronomy 1 courses, aimed at scientists (with mathematical background), are designed so that they can be taken in successive years to provide a more complete picture of the subject; the same is true for the Discovering Astronomy courses which are aimed at non-scientists with a little mathematical background.

Enthusiasts may, with advice, opt to take both courses running in one academic year. Astronomy 1S and Discovering Astronomy S cannot be counted for credit together; neither can Astronomy 1G and Discovering Astronomy G.

## Entry Requirements

These half courses do not have a formal entry requirement. However, for entry to Astronomy 1, prior attendance at a physical science course to SCE Higher Grade or equivalent is desirable. Some simple calculus is used in parts of Astronomy 1, and the underlying physics is discussed throughout the course. Complicated mathematics will not be used in Discovering Astronomy, but students are expected to be able to perform simple arithmetic and to understand basic geometry and simple algebra.

## Contacts

### *Astronomy Course Organiser*

Dr Ken Rice

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Tel.: 0131 668 8384

### *Course Secretary*

Ms Paula Wilkie

E-Mail: [paw@roe.ac.uk](mailto:paw@roe.ac.uk)

Tel.: 0131 668 8403

*Address:* Institute for Astronomy, Royal Observatory, Blackford Hill, Edinburgh, EH9 3HJ

## Course Home Page

The course home page is available on WebCT and can be accessed by registered students only through the MyEd portal ([www.myed.ed.ac.uk](http://www.myed.ed.ac.uk)). This website will include interactive course material, copies of the lecture notes, and self-test problems. All notices, announcements, and assessment grades will also be posted on this website, and there will be a discussion board allowing students to ask questions about the course or to provide feedback.

## Registration

In addition to formal registration through your Director of Studies, you **must** also complete a course registration form; these are on the web **at the URL above**. Paper copies will be available at the first few lectures, and **should be returned promptly** so that tutorial groups can be arranged.

## Timetable

Astronomy 1S and 1G run in the second semester, Discovering Astronomy G and S in the first. Lectures and tutorials are scheduled on Monday and Friday afternoons. Full details are given in this booklet and may be updated on the course web pages.

## Workload

In summary, **each** course has:

- ⊙ 30 contact hours
- ⊙ 5 tutorials (1 every two weeks) on Monday/Friday at 3pm, some including assessed work. This assessed work will count towards the final mark
- ⊙ 1 coursework exercise to be handed in (assessed and counts towards the final mark)
- ⊙ self-assessment problem sheets (also strongly recommended)
- ⊙ degree examination at the end of the course

## Observing

Free tickets for the Visitor Centre's public observing sessions on Friday nights will be available for first year students interested in some stargazing and perhaps thinking about getting involved in outreach work. These tickets are limited and booking is essential. Contact the Visitor Centre (0131 668 8404, 2-4pm, vis@roe.ac.uk).

## Tutorials

Each student will attend a total of 5 tutorials, 1 every 2 weeks. Tutorials will be held on Mondays and Fridays from 15.00 to 15.50, and students will be divided into groups during the first week. If you have a preference for a particular day, this can be noted on the registration form.

During these tutorial sessions, students will work in groups to answer questions that will be similar to those that you will see in the exam. At the end of each two week period students will hand in their solutions and three of these solutions will be assessed. The best 4 tutorial marks out of 5 will count towards your final degree mark. Students are encouraged to hand in all 5 sets of tutorial solutions, but by using the best 4 out of 5 means that students can miss one tutorial, if necessary, without being penalised. The tutorial deadlines will generally be the first lecture on the Monday after the final tutorial of each two week period. The exact dates of these lectures are shown in the timetables at the end of this booklet. **We will not accept work that is handed in after these deadlines.**

In semester 1, the first tutorial session for Discovering Astronomy S will start on the Monday of Wk 2 (28th September). We may have to ask students to volunteer for this session during the first lecture which will be on the previous Friday. In semester 2, the first session for Astronomy 1G tutorial will be at the beginning of week 2 (18th January).

## Textbooks

The Astronomy 1 course material does not follow a single textbook closely. A suitable first year level textbook is:

M Zeilik, S A Gregory, "Introductory Astronomy and Astrophysics", Saunders College Publishing (fourth edition, 1998).

The recommended textbook for Discovering Astronomy, and for students taking Astronomy 1 with Discovering Astronomy, is:

J Bennett, M Donahue, N Schneider, M Voit, "The Cosmic Perspective", Pearson/Addison Wesley (fourth edition, 2006).

Individual lecturers may recommend supplementary material from time to time; copies of this, and a few copies of the textbook, are usually available for consultation in the main library reading room.

### **Self-Assessment**

Answer sheets for all of the problems will be made available, so that you can check your work. If you have difficulties with the problems set, you should contact a member of staff in the tutorials.

Self-test problems will also be available on the course website on WebCT that can be accessed through the MyEd portal ([www.myed.ed.ac.uk](http://www.myed.ed.ac.uk)).

You are also expected to read through your lecture notes and handouts, and to read appropriate sections of the textbook. It is important that you wrestle with any difficulties yourself before coming back to us if you are still stuck.

### **Assessed Coursework**

In each Astronomy course you will be asked to hand in an assignment by the specified date given in the detailed timetable towards the end of this booklet. Details of the assignment (which may be in the form of an essay, a poster or numerical work) will be given several weeks in advance. You will have a choice of options for each assignment.

You *must* complete the coursework and hand it in *on time*. It will be marked and returned to you; there is a marking *penalty of 5% per working day*, for five days, with a mark of zero thereafter, for late work. *The assessed coursework is included in the final mark for the course*; see 'What is required to pass the course' below for details of how this is done. This means that any *marks lost for late coursework make it harder to pass the course*.

You must include a signed "Own Work Declaration" when handing in the coursework. A mark will not be given if this form is not signed and returned with your work. The form is available from the courses web page on WebCT or can be downloaded from the School's website:

[www.ph.ed.ac.uk/courseinfo/undergrad/Forms/plagiarism-declaration.pdf](http://www.ph.ed.ac.uk/courseinfo/undergrad/Forms/plagiarism-declaration.pdf)

## Clickers

We will be using clickers (formally known as a Personal Response System) in both Discovering Astronomy S but not in Astronomy 1G. If you don't already have a clicker, you will be able to collect one after the first lecture. The use of the clickers will be essentially anonymous and they will be used primarily to promote some interaction during the lectures, and to give the teaching staff some idea of how well the class as a whole understands the material that is being taught.

## Examinations

The examinations for the Discovering Astronomy S and Discovering Astronomy S Courses have the following format:

- A two hour exam consisting of a multiple choice section, a short questions section and a problem-solving section.

The examinations for the Astronomy 1G and Astronomy 1S have the following format:

- A two hour exam consisting of a short questions section and a problem-solving section.

Degree examination papers - but not multiple choice sections - for previous years are available (see our web pages). Departmental calculators will be issued for use in the examinations.

## What is Required to Pass the Course

The course grade and pass/fail will result from the degree examination mark (or August re-sit), the assessed tutorial problems and the coursework marks. Note that, to be awarded a pass on the course, in addition to achieving the *overall* pass mark (40% on the University Common Marking scale) you must score a minimum of 40% on the Degree Examination itself. A student that scores 40% overall, but scores less than 40% on the Degree Examination will fail with a U grade. The overall pass mark is calculated from:

- 2/3 examination
- 1/6 coursework assignment
- 1/6 assessed tutorial problems

## Plagiarism

The University regulations in relation to plagiarism are detailed in Section 14 of the *Undergraduate Assessment Regulations*; these are available on-line at:

<http://www.aaps.ed.ac.uk/regulations/exam.htm>

The following are extracts from section 14 of the 2008/2009 regulations:

14.1 Plagiarism is the act of copying or including in one's own work, without adequate acknowledgement, intentionally or unintentionally, the work of another. It is academically fraudulent and an offence against University discipline. Plagiarism, at whatever stage of a student's course, whether discovered before or after graduation, will be investigated and dealt with appropriately by the University.

14.2 All work submitted for assessment by students is accepted on the understanding that it is the student's own effort without falsification of any kind. Students are expected to offer their own analysis and presentation of information gleaned from research, even when group exercises are carried out. In so far as students rely on sources, they should indicate what these are according to the appropriate convention in their discipline. The innocent misuse or citation of material without formal and proper acknowledgement can constitute plagiarism, even when there is no deliberate intent to cheat. Work may be plagiarised if it consists of close paraphrase or unacknowledged summary of a source, as well as word-for-word transcription. Any failure adequately to acknowledge or properly reference other sources in submitted work could lead to lower marks and to disciplinary action being taken.

The submission of all continually assessed work\* that count towards Degree Examinations must be accompanied with a signed copy of the *University of Edinburgh - Own Work Declaration* form, a copy of which is included in the appendices. This form is also available for download from

<http://www.ph.ed.ac.uk/teaching/>

in either PDF or Microsoft Word format. Paper copies are also available from the *Teaching Office* and laboratory technicians.

*Group Work* or *Team Review* reports must be accompanied by a single declaration signed all of the group members.

Note all submitted continually assessed work\* is retained by the School for four months after the meeting of the Board of Examiners assessing this work. It is then securely destroyed. Neither originals or copies can be returned. It is recommended that students make a copy of their work prior to submission.

*\*this does not include weekly hand-ins*

## Disability and Specific Learning Difficulties

The University has a duty under the *Disability Discrimination Act 1995* to make 'reasonable adjustments' for students who are disabled. Please feel free to discuss any requirements you have with your *Director of Studies*. They may refer you on to the *Disability Office*, or you can contact them at any time yourself at:

Disability Office  
The University of Edinburgh  
6 South College Street  
Edinburgh EH8 9AA

Telephone: 0131 650 6828

Textphone: 0131 650 9371

Email: [Disability.Office@ed.ac.uk](mailto:Disability.Office@ed.ac.uk)

<http://www.disability-office.ed.ac.uk/>

Before any specific adjustments can be made the University requires evidence of either disability (usually a letter from your GP) or learning difficulty (a diagnostic assessment from a Chartered Educational Psychologist). The Disability Office can advise on this. Once the Disability Office receives your evidence they will carry out a needs assessment and develop a personalised *Learning Profile* which will contain specific adjustments, for example extra examination time, large print course notes etc. This profile will be communicated by the *Disability Office* to the School, your Director of Studies and to *Registry*. The School will endeavour to comply with its conditions in a timely manner. The content of this *Learning Profile* will, where practical, be kept confidential, but to supply the required assistance it is necessary to pass on some details, in particular the adjustments that need to be made, to *Course Coordinators*, *Course/Laboratory Organisers* and *Teaching Office* staff. Students should discuss with the *Disability Office* if there are parts of their *Learning Profile* they wish to be kept strictly confidential. Students registered under this scheme should check with the *School Teaching Administrator* at the start of Semester 1 that suitable arrangements have been put in place.

Students with specific learning difficulties that affect continuously assessed work, for example project reports, essays, weekly hand-ins, etc, have been issued with stickers which they can attach to the front cover of such submitted work. See the *Disability Office* web site for details of this scheme.

Students with short term disability, for example as a result of accident or injury, may also seek assistance from the *Disability Office*, either directly or via their *Director of Studies*. For minor incidents, back copies of missed lectures etc. can be obtained from the *Course Organiser* or the *School Teaching Administrator*.

## **Appeals**

The University has two official channels for resolution of student grievances, these being the *Student Complaints Procedure* to deal with non-examination related issues and the *University Appeals Procedure* to deal with examination issues and results.

***Student Complaints Procedure:*** Full details of the Student Complaints Procedure can be found online at:

[www.aaps.ed.ac.uk/regulations](http://www.aaps.ed.ac.uk/regulations)

A paper copy of this document is also available from the Teaching Office of the School of Physics.

***Appeals Procedure:*** The formal University appeals procedure is detailed in the Degree Examination Regulations at:

[www.aaps.ed.ac.uk/regulations/exam.htm](http://www.aaps.ed.ac.uk/regulations/exam.htm)

Students considering a complaint or appeal are strongly advised to discuss the matter with their Director of Studies or with the Head of School.

## **Student Feedback**

We strongly encourage student feedback as this is the primary way in which we can improve the course and how it is presented to you. You can provide feedback by going directly to the lecturer, by talking to your class representative, who will be elected during the first lecture, by filling in the questionnaires that will be handed out at the end of each section, or by using the WebCT discussion boards.

## **Data Protection**

Personal information related to the course will be held and used within the constraints of the University's data protection registration.

## Discovering Astronomy S: Stars & Planets

22 September to 04 December

**Monday 14.00** Appleton Tower, Theatre 4

**Monday 16.10** Appleton Tower, Theatre 3

**Friday 14.00** Appleton Tower, Theatre 4

Wk	Date	Day/Time	Module	Lecturer
1	25 Sep	F2	Introduction	Prof AS Trew
2	28 Sep	M2, M4	Introduction to Astronomy	Prof AS Trew
	02 Oct	F2	The Physical Framework	
3	05 Oct	M2, M4	Matter & Energy	
	09 Oct	F2	Telescopes & Detectors	
			<b>12 Oct, M2: Tutorial 1 deadline</b>	
			<b>Coursework assignment set: Monday 12 Oct.</b>	
4	12 Oct	M2, M4	Stellar Properties	
	16 Oct	F2	Stellar Structure	
5	19 Oct	M2, M4	Our Sun & the Solar System	Dr WKM Rice
	23 Oct	F2	Terrestrial Planets	
6	26 Oct	M2*, M4	Jovian Planets	
			<b>*26 Oct, M2: Tutorial 2 deadline.</b>	
	30 Oct	F2	Star Death	
7	02 Nov	M2, M4	Remnants of Rocks & Ice	
	06 Nov	F2	Other Planetary Systems	
8	09 Nov	M2*, M4	Star Birth	Prof AF Heavens
			<b>*09 Nov, M2: Tutorial 3 deadline.</b>	
	13 Nov	F2	Stellar Evolution	
			<b>*13 Nov, F2: Coursework deadline.</b>	
9	16 Nov	M2, M4	The Formation of the Solar System	
	20 Nov	F2	The Formation of Extrasolar Planets	
10	23 Nov	M2*, M4	Habitability	
			<b>*23 Nov, M2: Tutorial 4 deadline.</b>	
	27 Nov	F2	Life in the Universe	
11	30 Nov	M2, M4	Short practice exam in M2, feedback in M4.	
			<b>04 Dec, F2: Tutorial 5 deadline.</b>	
	07-18 Dec		<b>Exams.</b>	

**Tutorials:** at 3pm on Monday and Friday. The class will be organised into 8 groups. Each group will get 5 tutorials sessions; details of dates, times and locations for each group will be posted in the course web pages.

**Course requirements:** We expect you to attend all the lectures and tutorials provided for you. The lectures present a guide to the material and set out the foundations of the course in the way that it will be examined (the lecturers are the examiners). The material covered by the exercises undertaken in the tutorials is intended to complement the lectures and may also be examined.

## Astronomy 1G: Galactic and Cosmological Science

11 January to 26 March

**Monday 14.00 Appleton Tower, Theatre 4**

**Monday 16.10 Appleton Tower, Theatre 1**

**Friday 14.00 Appleton Tower, Theatre 4**

Wee k	Date	Day/Time	Module	Lecturer
1	11 Jan	M2, M4	Science of Astronomy	Prof A Lawrence
	15 Jan	F2	Science of Astronomy	
2	18 Jan	M2, M4	Science of Astronomy	Prof A Lawrence
	22 Jan	F2	Science of Astronomy	
3	25 Jan	M2, M4	The Milky Way and Galaxies	Prof A Lawrence
	29 Jan	F2	The Milky Way and Galaxies	
. <b>*01 Feb, M2: Tutorial 1 deadline</b>				
<b>Coursework assignment set: Monday 01 Feb.</b>				
4	01 Feb	M2*, M4	The Milky Way and Galaxies	Prof A Lawrence
	05 Feb	F2	The Milky Way and Galaxies	
5	08 Feb	M2, M4	Active Galaxies and Black Holes	Dr K Rice
	12 Feb	F2	Active Galaxies and Black Holes	
6	15 Feb	M2*, M4	Active Galaxies and Black Holes	Prof A Lawrence
	19 Feb	F2	Active Galaxies and Black Holes	
7	22 Feb	M2, M4	The Distribution of Galaxies	Prof A Lawrence
	26 Feb	F2	The Distribution of Galaxies	
8	01 Mar	M2*, M4	The Distribution of Galaxies	Prof J Dunlop
	05 Mar	F2	The Distribution of Galaxies	
9	08 Mar	M2, M4	Cosmology	Prof J Dunlop
	12 Mar	F2	Cosmology	
10	15 Mar	M2*, M4	Cosmology	Prof J Dunlop
	19 Mar	F2	Cosmology	
	22 Mar	M2, M4	Short practice exam in M2, feedback in M4.	
	26 Mar	F2	<b>26 Mar, F2: Tutorial 5 deadline.</b>	
	14-23 Apr		<b>Exams.</b>	

**Tutorials:** at 3pm on Monday and Friday. The class will be organised into 8 groups. Each group will get 5 tutorials; details of dates, times and locations for each group will be posted in the course web pages.

**Course requirements:** We expect you to attend all the lectures and tutorials provided for you. The lectures present a guide to the material and set out the foundations of the course in the way that it will be examined (the lecturers are the examiners). The material covered by the exercises undertaken in the tutorials is intended to complement the lectures and may also be examined.