What is S284, and how to study it

This item contains selected online content. It is for use alongside, not as a replacement for the module website, which is the primary study format and contains activities and resources that cannot be replicated in the printed versions.

Contents

1 Module overview

Approximately 2 units of study time.

Note: these boxes provide an indicative sense of how much time it is likely to take *you* to study a given section of the learning material. They are described fully in Section 2.3.2 of this guide. Sections that are likely to require less than 5 minutes to study do not have these boxes.

Key point

This guide explains what S284 is and how you should study it. It is imperative that you spend your study time this week working through all the information in this item, which we shall refer to as 'the guide' when necessary for conciseness. The guide also includes a checklist in Section 7.2 with suggestions for your self-directed study time this week.

Welcome to S284 *Astronomy*.

This module considers some of the most important questions about the Universe around us:

- How are stars formed, how do they live and evolve, and what happens when they die?
- How are galaxies formed, and how do they behave and change throughout the lifetime of the Universe?
- How can we understand stars and galaxies using multiwavelength observations across the electromagnetic spectrum?

These questions have challenged scientists for many years. You will see how progress has been made in answering them, and consider the evidence that supports theories about the nature of the Universe and its contents.

The banner image on the home page of the module website, which is repeated below as Figure 1, is central to these themes. It comprises an image of the sky with the plane of our Galaxy (known as the Milky Way) running along the centre. Each slice of the image is obtained using a different part of the electromagnetic spectrum. Starting on the right-hand side, the images cover gamma (γ) ray, X-ray, ultraviolet (UV), visible light, hydrogen (Hα) emission, near infrared (IR), far infrared, microwave, neutral hydrogen emission and radio wave.

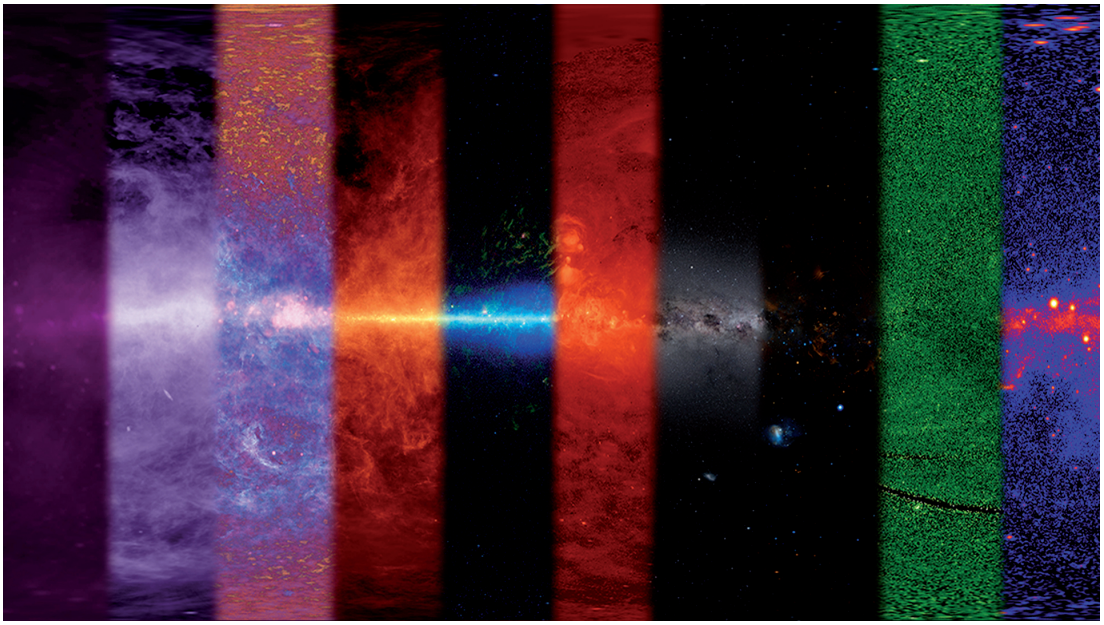


Figure 1 This figure has been collated by piecing together tenths of ten different all-sky surveys of the Universe, so that the total image covers the whole of the visible sky in a '2D' projection. Across the centre of this image lies the plane of our Galaxy (known as the Milky Way).

You will revisit this image at various points during your study of this module, and learn about modern astronomy's multiwavelength approach to studying the stars and galaxies in our Universe, as well as imaging and projections.

The following video, presented by Helen Fraser, the S284 Production Module Team Chair, introduces the astronomy topics that you'll cover in S284.

Video content is not available in this format.

Video 1 What is in S284?

The module team hopes that you will find the topics that are covered by S284 interesting and that you will enjoy studying these concepts and processes, which are at the cutting edge of modern astronomy.

1.1 Scope of the module

Approximately 2 units of study time.

As outlined in the previous video, S284 is split into seven topics, each of which you will study over four weeks. The first three weeks' study of each topic present the core material, while the fourth week provides a chance to review the topic and complete the assessment tasks associated with it. The titles of the topics are as follows:

Topic 1: Cosmic length scales
Topic 2: The spectral Universe
Topic 3: Mapping the Universe
Topic 4: Birth and life
Topic 5: Evolution and death
Topic 6: The extreme Universe
Topic 7: Cosmic timescales.

The first three topics introduce the various tools used by astronomers, including astrometry, photometry, spectroscopy and imaging. The next three topics look in detail at how stars and galaxies are born, evolve and die, and may even be reborn in other guises. The final topic then revisits much of the content of the rest of the module, but this time from the perspective of the timescales of various processes.

Each of these topics is explained in more detail below, summarising what was said in Video 1.

Cosmic length scales

This introductory topic provides a toolkit of techniques that you will use throughout the rest of the module.

- Part 1 explores astrometry – measuring the positions of astronomical objects – and develops ideas around the concept of angular measurements and how the positions of stars change with time.
- Next, Part 2 focuses on photometry – measuring the brightnesses of astronomical objects – and introduces the concepts of astronomical magnitudes, colours and light curves.
- Part 3 shows how measurements of positions and brightnesses can be used to establish astronomical length scales and develops the idea of the cosmic distance ladder.

The spectral Universe

The second topic provides more tools for understanding the Universe, this time focussing on spectroscopy.

- Part 1 looks at the spectral continuum, and shows how this can tell us about the mechanisms producing the electromagnetic radiation that we observe, and the temperature of the emitting objects.
- In Part 2, the focus is on spectral lines, and what they imply about the physical conditions within astronomical objects, and their elemental composition.
- Part 3 then focuses on spectra and motion, and shows how the phenomenon of the Doppler shift is used to infer the speeds with which astronomical objects are moving towards or away from us.

Mapping the Universe

The third topic completes the first half of the module, and presents further approaches that astronomers use to understand the Universe.

- In Part 1, you will learn about astronomical images obtained across the electromagnetic spectrum, and the various types of extended objects that these reveal.
- Part 2 of the topic describes how astronomers can use images to organise and classify the objects they observe into different categories.
- Part 3 then considers those aspects of the Universe that we cannot observe directly – such as dust, black holes and dark matter – and shows how we can infer their presence by indirect means.

Birth and life

Topic 4 concerns the birth of stars and galaxies and how they live.

- Part 1 describes how stars are born from collapsing clouds of gas, and how this leads to the range of stellar masses and different types of star cluster that we observe.
- Part 2 then considers the so-called ‘main sequence’ life of stars: the phase in which stars spend the majority of their lives, undergoing nuclear fusion in their cores.
- Part 3 switches focus to consider how entire galaxies are born – including our own Galaxy, the Milky Way – and the more extensive structures of galaxy clusters.

Evolution and death

The life cycle of stars and galaxies is explored further in Topic 5.

- The first part of the topic considers the ‘post-main sequence’ evolution of stars – how they behave once the nuclear fuel in their cores begins to be depleted.
- This leads into Part 2, where the death of stars is discussed, including supernovae, and their end points as stellar remnants.
- Part 3 explores how entire populations of stars change with time, and how this may be observed as the evolution of galaxies as a whole.

The extreme Universe

In Topic 6 the focus is on extreme environments in the Universe, where gravitational fields, magnetic fields, or temperatures are extremely high. In environments such as these, compact objects – white dwarfs, neutron stars or black holes – may be reborn and re-energise their surroundings.

- Part 1 considers ‘active galaxies’. These contain supermassive black holes in their centres and are often accreting vast amounts of matter, and creating outflows that transfer energy and matter back into their environment.
- In Part 2 the focus is on accreting compact binary stars in which stellar remnants accumulate material from a companion star, often giving rise to outbursts, or high energy emission, as a result.
- Part 3 describes radio pulsars of various kinds, and also looks at double degenerate objects, in which pairs of neutron stars or black holes can spiral together, and have recently been detected via their emission of gravitational wave radiation.

Cosmic timescales

This final topic of the module is essentially a revision of the earlier content, but this time looking at phenomena from the perspective of their timescales, rather than their length scales.

- Part 1 begins by discussing timescales for cosmic processes, including timescales local to us here on Earth, atomic timescales and orbital timescales of various kinds.
- Part 2 focuses on the various timescales relevant to the evolution of stars, including their birth, life, and death.
- Finally, Part 3 considers timescales for the evolution of stellar systems, from binary stars to entire galaxies.

Key point

S284 does not cover all aspects of astronomy – in particular, we do not discuss planetary science, which includes bodies such as planets, moons, comets and asteroids, nor do we consider the broader topic of cosmology and the evolution of the Universe as a whole. These topics are covered in other Open University (OU) modules.

1.2 Learning outcomes

Approximately 1 unit of study time.

The module is designed to address a set of learning outcomes that specify the areas of knowledge and understanding, and the skills that are developed through the module as a

whole. These learning outcomes may be used to guide your understanding of the module and are specified as follows.

Knowledge and understanding (KU)

- KU1 Understand key ideas, concepts and principles in astronomy, across themes of time and distance, applied to stars and galaxies, including multiwavelength observational methods.

Cognitive skills (CS)

- CS1 Use appropriate searching, graphical, and mathematical methods to gather, analyse and interpret astronomical data and information.
- CS2 Use astronomical concepts and information, combined with basic physics and mathematics developed in SM123 and MST124, and apply them to relevant situations, including unfamiliar problems.
- CS3 Use concepts of accuracy, precision, and uncertainty to understand limitations and ambiguity in the context of astronomical measurements.

Key skills (KS)

- KS1 Produce coherent and clear written arguments in appropriate scientific language.
- KS2 Use software and other tools to analyse and present data and models.
- KS3 Acquire and analyse scientific information from a wide range of sources.

Practical and/or professional skills (PPS)

- PPS1 Carry out investigative science, make and accurately record observations, and use these to draw informed conclusions about the subject of the investigation.
- PPS2 Actively engage with the module community through contribution and participation.
- PPS3 Plan your learning, reflect on your development and use these reflections to inform your future work.

Note that the assessment of the module is explicitly linked to these general learning outcomes, as detailed in each assignment.

1.3 Assumed prior knowledge and skills

Approximately 1 unit of study time.

You do not need any prior knowledge of astronomy to make a success of S284, but if you do have some, you are likely to find studying the module easier.

We recommend that you have a working knowledge of physics and maths equivalent to OU Level 1 study. You will have achieved this if you have studied the OU Level 1 science module S111 *Questions in science*, as well as SM123 *Physics and space*. The content in S284 assumes that you have an understanding of the basic scientific and study skills covered in these two modules.

Furthermore, we recommend that you should have studied the OU Level 1 mathematics module MST124 *Essential mathematics 1* (or achieved an equivalent mathematical qualification), to enable you to apply this mathematical knowledge to the astronomy challenges presented in S284.

If you have not studied any one (or all) of the OU Level 1 modules listed above then (if you have not done so already) you should assess your preparedness by completing the self-assessment questions in the Are you ready for S284? resource. At the end of that self-assessment quiz there are recommended actions relating to how you found answering the questions: we urge you to follow this advice carefully.

The S284 boot camp

As you may have already seen, for the two weeks prior to the official module start there is the S284 boot camp: an online activity open to all S284-registered students. The boot camp covers topics across physics, maths and study skills specific to S284. If you have not already done so, we strongly advise you to put some self-directed study time aside to complete it.

In previous Level 2 astronomy modules, students who actively engaged with the boot camp activity scored on average higher in their TMAs and exam, and therefore were more likely to complete and pass the module. By participating, you will be able to revise and refresh your background knowledge, familiarise yourself with the study materials you will use in S284, understand how the tutorial tools and structure of S284 will help you to study and succeed, and meet some of your fellow students.

The module team particularly recommends that if you are new to OU study, or haven't studied any (or all) of S111, SM123 and MST124, you should participate in the boot camp in full. However, don't worry if you are reading this after the event and thinking you've 'missed it'. Whether or not you attended boot camp when it 'officially' ran, you can use your self-directed study time this week and over the next few weeks to revise and refresh all the background science in the boot camp materials. They are there in case you should get stuck with anything during S284, and your tutor may refer you back to boot camp during the module to help explain certain ideas.

Key point

Even if you feel that you are well prepared for S284, the boot camp is vital preparation for starting your Level 2 astronomy studies. All the boot camp resources remain active for this entire module and you can refer back to them at any time. Simply follow the links in study weeks –2 and –1, or look under the `Resources` section on this website. The 'background science' materials that supplement the boot camp are also available as a downloadable resource from the same section of this website.

1.4 Employability


Approximately 2 units of study time.

A key thing that you will develop by completing S284 is a broad set of employability skills.

Throughout S284 you will develop many different skills, as well as enhancing your astronomy knowledge and your maths and physics skills. But when it comes to applying for a new job or a promotion (perhaps even during your studies), making a career change when you graduate, or even applying for a Masters or PhD programme, significant emphasis is also often placed on your so-called 'soft' skills.

These are transferable skills that are vital to university study as well as the workplace, almost regardless of what you are studying or the job you are doing. You may be expected to demonstrate where and when you have learned or successfully applied these soft skills:

- on your CV
- by giving examples in application forms or covering letters or
- perhaps in interviews.

Recalling examples of such skills can be difficult – even if you've practised them and applied them many times before, without thinking about it. So, to help you with this, each topic of S284 highlights one particular employability skill via the work that you will do in the topic activity. These activities are, of course, focused on astronomy, and they feed into the tutor-marked assignments (TMAs) that you must submit during the module. However, each activity also implicitly involves one of the employability skills, and offers a chance for you to record an example of where you have demonstrated use of that particular skill.

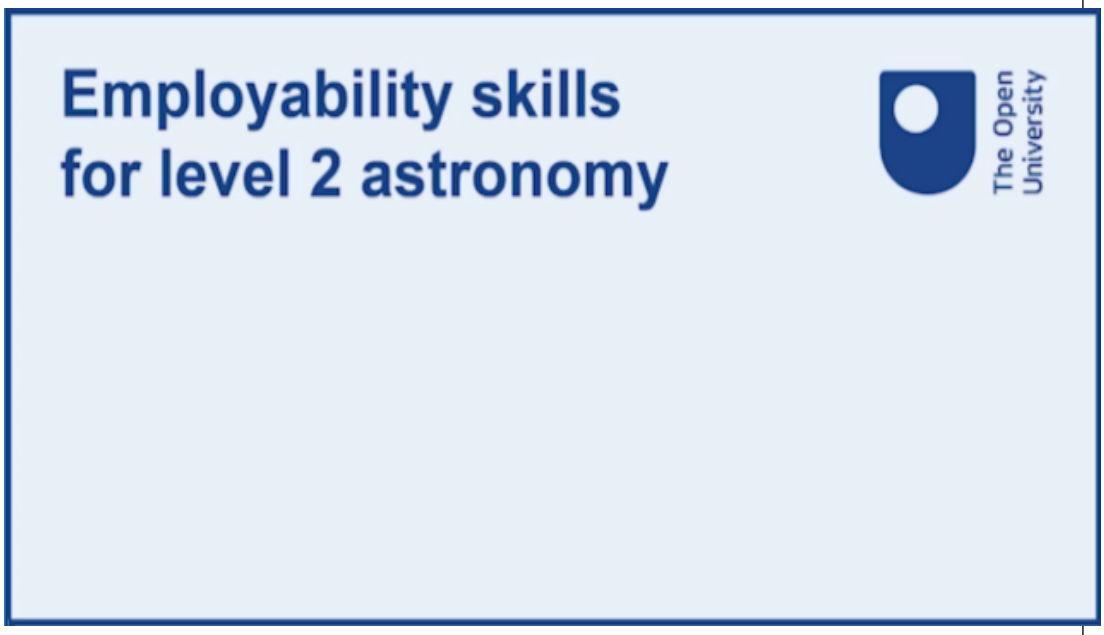
The employability skills associated with the topics are:

Topic 1: self-management and resilience
Topic 2: problem solving
Topic 3: numeracy
Topic 4: communications skills (writing)
Topic 5: digital literacy
Topic 6: self-awareness and transferable skills
Topic 7: global citizenship.

These skills are also highlighted in the OU Employability Framework, as described in the introduction to the OU's FutureYOU Personal Development Planning (PDP) tool. You may like to link what you are learning in S284 to your PDP record described there.

The S284 module team asked some previous OU astronomy students to tell us where and when these skills were used in their own OU studies and, in particular, how they have developed and used them in their subsequent work and study. The following video introduces these students and gives you an idea of the diversity of sectors in which they are now employed, and how they are using transferable skills from Level 2 astronomy.

Video content is not available in this format.
Video 2 Employability skills for Level 2 astronomy



You'll find further inspiring words from these students in the tutorials for each of the S284 topics, and other parts of the study material.

2 Studying S284

Approximately 1 unit of study time.

The following sections explore various aspects of studying S284 in more detail, but first Video 3 introduces the key study skills, structure, assessment and tutorial support in the module.

Video content is not available in this format.
Video 3 How to study S284.

2.1 The study planner

Approximately 1 unit of study time.

At the core of the S284 website is the interactive study planner, which comprises most of the home page of the module website. This planner is calendar-driven, and is intended as a guide to help you pace your study of the module.

The planner is organised by topic, across the seven topics in S284. Each topic fills three weeks of study time, and is then followed by a topic 'review and assessment' week. You'll notice, therefore, that the planner sometimes shows a single week's worth of work (in the

‘Introduction to S284’ week and ‘assessment’ weeks), and sometimes three weeks’ worth of work (during a topic). Within a topic the work is broken down again into three parts, and each part of each topic should take one week of study.

The planner provides guidance as to the material we expect you to study during that period, and it indicates the exact range of dates when we suggest you should attempt each task. Tutor-marked assignments (TMAs) and exams are included on the planner, along with their cut-off date deadlines.

You will also be able to access S284 tutorials via the study planner, if you have chosen for these to be displayed. It is important to note that, although you can generally study at your own pace, the exam weeks (study weeks 14 and 31) do not have *any* flexibility – more on this in Section 3.2 of the guide.

It may be helpful to some of you to visualise the entire S284 study schedule week by week. Figure 2 shows a generic study calendar for S284, so you can see how the various components fit together.

Generic study calendar
S284 Astronomy

Study week	Start date	Reading	Tutorials and forums	Activities	Assignment and weighting/%	
−2	early Sept	(Module website opens)	Café forum opens			
−1		Boot camp	Boot camp forum opens			
0		Boot camp				
1	early Oct	**What is S284, and how to study it**	direct contact from your tutor module forums open Boot camp forum closes		**TMA 00**	**0**
2		**Topic 1 Cosmic length scales**		video tutorial		
3		Topic 1	tutorials			
4		Topic 1		leading to TMA 01		
5	late Oct	Review and assessment 1			**TMA 01**	**8**
6		**Topic 2 The spectral Universe**		video tutorial		
7		Topic 2	tutorials			
8		Topic 2		leading to TMA 02		
9	late Nov	Review and assessment 2			**TMA 02**	**8**
10		**Topic 3 Mapping the Universe**		video tutorial		
11		Topic 3	tutorials			
		2-week BREAK about here				
12		Topic 3		leading to TMA 03		
13	early Jan	Review and assessment 3		Specimen Exam Part 1	**TMA 03**	**8**
14	mid Jan	**Online Exam Part 1**			**iCME 81**	**12**
15		**Topic 4 Birth and life**		video tutorial		
16		Topic 4	tutorials			
17		Topic 4		leading to TMA 04		
18	mid Feb	Review and assessment 4			**TMA 04**	**8**
19		**Topic 5 Evolution and death**		video tutorial		
20		Topic 5	tutorials			
21		Topic 5		leading to TMA 05		
22	mid Mar	Review and assessment 5			**TMA 05**	**8**
23		**Topic 6 The extreme Universe**		video tutorial		
24		Topic 6	tutorials			
		1-week BREAK about here				
25		Topic 6		leading to TMA 06		
26	mid Apr	Review and assessment 6			**TMA 06**	**8**
27		**Topic 7 Cosmic timescales**		video tutorial		
28		Topic 7	tutorials			
29		Topic 7		leading to final assessment		
30	mid May	Review and revision week	all forums close	Specimen Exam Part 2		
31	late May	**Online Exam Part 2**			**iCME 82**	**40**

Note: this is a GENERIC study calendar and the exact timing of the break weeks will vary.

Figure 2 A generic study calendar for S284 showing the overall module structure.

From this figure it is much easier to visualise the module structure.

- You can see the seven topics (three weeks long), always followed by a topic 'review and assessment' week.
- You can identify when the Online Exam Part 1 and Online Exam Part 2 are scheduled (study weeks 14 and 31, respectively).
- You can see how tutorials, activities and TMAs fit into the study weeks.
- The opening and closing dates of forums are also indicated.

It is important to note that the exact locations of Christmas and Easter study breaks on this generic calendar are indicative – they can vary by a few weeks depending on when modules start and when Easter falls in a particular year.

Key point

You can also download this year's Summary study calendar PDF, which shows the details specific to *this particular presentation* of S284. (You are, of course, now in study week 1!) We encourage you to print this PDF off and keep it near your study area/notes, so you can refer to it at a glance if you need to.

2.2 Modes of delivery

Approximately 1 unit of study time.

S284 is delivered online, through the module website. As you saw in the last section, each of the seven topics is designed to be studied over four weeks. The first three weeks contain the three 'parts' of each topic, while the fourth week focuses on reviewing and reflecting on the topic that you've just studied, and completing the associated TMA (for Topics 1–6).

As well as presenting you with text, equations, diagrams and images, you will see that the study material contains other things embedded within it. These include:

- *Unnumbered questions*: these are intended to be a 'stop and think' moment, with an answer that may be revealed by clicking on a button.
- *Numbered questions*: where you are expected to work something out or write a few lines in response. Again, suggested answers may be revealed by clicking on a button. Some questions have multiple variants, such that you may be presented with a different version of the question each time you reload the page. (This is stated for individual questions, when applicable.)
- *Examples*: where a question and its answer are displayed for you to illustrate a particular technique. Some of the example solutions are presented as videos where one of the module authors works through the solution on screen. Often an example will be followed by a similar question for you to try yourself.
- *Exercises*: these provide opportunities for investigative work, perhaps using an external website or an interactive tool, where you are presented with a series of tasks to attempt. Suggested responses to the tasks may be revealed by clicking on a button. Some exercises feed directly into TMA questions.
- *Activities*: there is one activity per topic, usually in the third week of study for the topic. Each activity comprises a significant investigation based around one of the employability skills mentioned earlier. The activities in Topics 1–6 each feed into the associated TMA for that topic.
- *Videos and audio tracks*: each has an associated transcript (unless the item is hosted outside the module website, on YouTube for example), and videos also contain the option for closed caption subtitles (unless there is no verbal accompaniment).
- *Interactive diagrams*: there are a few key diagrams which we have made into interactive explorations of data and processes. These include various versions of a

'Scales Tool' allowing you to explore length and timescales in astronomy, and an interactive Hertzsprung–Russell (H–R) diagram to investigate the evolution of stars.

Some questions and exercises have boxes into which you may type your answers. These are not marked, but they can be a useful way to check your understanding, or may be used for reflection and revision purposes.

The only printed item that forms part of the S284 study materials is an *Extended Summaries Booklet*. This will be posted to you, although a PDF version is also available from the `Resources` section on this website. For more information about the booklet see Section 2.7 of this guide.

2.3 Planning your study

We have carefully designed the content of S284 to be studied within the recommended time allocated for a 30-credit, OU Level 2 module. For most students, this should amount to a total of around ten hours per week, with directed learning making up about six of those hours and self-directed learning making up the remaining four. These two different forms of study are explained in the next section.

2.3.1 Directed and self-directed learning

Approximately 1 unit of study time.

The various types of learning that you will encounter each week may be categorised as follows.

Assimilative learning

A major component of your directed learning in S284 is studying the module content, and making notes on what you read and learn as you go along. You should also engage with tutorials, including both video tutorials and online drop-in sessions with your tutor. Assimilative learning is expected to take up approximately 40% of the total study time for the module.

Other directed learning

Outside your reading, note-taking and tutorial activities you will engage in other forms of directed learning, including:

- finding and handling information (for example, carrying out exercises that involve searching a database, or using the OU Library)
- productive activity (such as writing answers to questions)
- experiential activity (carrying out experiments or investigations)
- interactive activity (working with interactive multimedia) and
- assessment (including questions that you meet in the topics, as well as the TMAs and exam).

All these activities are designed to allow you to apply what you've learned to specific problems, to introduce the 'tools of the trade' of an astronomer, or to give practical examples of material covered in the module. Some are based on spreadsheet exercises or interactive tools, others may ask you to watch a short video or listen to an audio track, while others may involve using external websites or items of third-party software. The instructions for the activities are provided at the point of use.

These elements are expected to make up a further 20% of your study.

Self-directed learning

Self-directed learning is expected to make up as much as 40% of your study. This includes the time it takes to:

- access the S284 website (e.g. set up your computer and get online)
- communicate with your tutor or tutor group, or communicate with other students either via email or on the online discussion forums
- sort out and collate your files and notes at the end of a week's study
- reflect on your study (including things such as assessment feedback received from your tutor)
- brush up on any study or maths skills
- undertake any additional activities you choose to engage in associated with your study of S284.

These different types of learning activity, and the approximate amount of time taken up by them over the course of a week's study, are summarised in Figure 3.

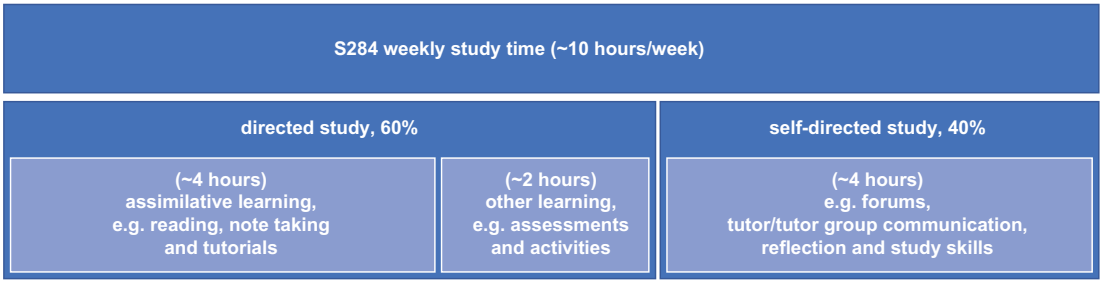


Figure 3 How study time is broken down in S284.

2.3.2 Pace of study


Approximately 3 units of study time.

To help you understand how long a given piece of the module material is likely to take you, we have made use of a visual guide using pencil icons. At the top of each section of work (such as this one), you will see a note that indicates how many units of study time we anticipate it will take.

We expect 1, 2 and 3 pencils to equate to roughly 10, 20 and 30 minutes of study time, respectively. More lengthy items, such as activities or tutorial videos, may have a tariff of 5 pencils and equate to about an hour of study time. Each week of the module therefore has about 36 'pencils' of directed study time allocated to it, comprising the nominal 6 hours of directed learning.

These timings are based on a reading speed of 35 words per minute (wpm) for the main study materials, with separate allocations for comprehending each equation, image, diagram, video or audio track, and for completing each question, example or exercise. In most of this guide, which contains less scientific information than the topic materials, we have assumed a reading speed of 70 wpm. The wpm rate *includes* the time needed for you to make your own notes on what you have just studied.

Of course, not everyone studies at the same speed. Some students will take longer than 10 minutes to study a '1 pencil' section, while others will take less time than this – everyone is different. The following short exercise will help you to gauge your own study speed, based on some typical content from the module.

Exercise 1 Study time self-assessment

Task 1

Follow the link below to a '2 pencil' section of study material from an early part of Topic 1. Time how long it takes you to read through it at your natural pace, study the examples, complete the questions and make notes as you go. Record the timing in the box below, and then save your answer to reveal the discussion underneath it.

Note that when you click on the link below you will navigate away from this page. To return to it you can use the 'back' button in your browser, or alternatively you may wish to open the link in a new browser tab or window (typically, by holding the `Ctrl` or `Shift` keys when clicking on the link, or right-clicking it with your mouse or keypad and selecting the required option).

- Access Section 1.1.2 from Topic 1

Provide your answer...

Discussion

This is now your personal 'study rate' for the remainder of S284; you'll use this information in Task 2.

Task 2

Using the time you have measured in Task 1, complete the final column of this table to gauge how much study time you might need for different parts of the module material.

Table 1 Estimates of your study rate.

Symbol	Study units	My estimates
	1	0.5 × time from Task 1 *Provide your answer...*

✎✎	2	Time from Task 1 *Display of content entered previously*
✎✎✎	3	1.5 × time from Task 1 *Provide your answer...*
✎✎✎✎	4	2.5 × time from Task 1 *Provide your answer...*
✎✎✎✎✎	5	At least 3 × time from Task 1 *Provide your answer...*

Discussion

This is now your personal ‘study clock’ for the remainder of S284; it will help you to estimate how long your directed study might take you. You may want to replicate this table in your notes, or take a screen shot to save and/or print off for future reference.

2.4 Assessment

✎ Approximately 1 unit of study time.

The various items that you submit for marking in S284 combine to give an Overall Score for the module as a whole. These items fall into two categories:

- tutor-marked assignments (TMAs)
- two parts of the online exam.

Tutor-marked assignments

There are six short TMAs to submit for S284, one for each of the first six topics of the module. Links to these assignments, and any associated materials, will be made available via the study planner in the ‘review and assessment’ week for each of those topics. That week is set aside for reflecting on the topic content and completing the TMA.

Key point

You will produce work that forms part of your TMA submission as you undertake the exercises and the activity for each topic, so you may have completed much of the TMA before the scheduled assessment week.

The link and the cut-off date for each TMA is also given within the `Assessment` section on the module website, and the cut-off dates are listed in your interactive study planner. The `Assessment` section also holds a record of your assignment scores as you proceed through the module.

In this module the TMA cut-off dates are at noon on Thursdays. For more information on TMA cut-off dates see the Assessment Handbook.

Online exam

In addition to the TMAs, S284 has an interactive online exam that is split into two parts, referred to as Online Exam Part 1 (or iCME 81) and Online Exam Part 2 (or iCME 82).

- The first, shorter, part of the online exam occurs after you have studied Topics 1–3, and assesses your understanding of the various astronomical tools that are presented in those topics.
- The second, longer, part of the online exam occurs at the end of the module, and assesses your understanding of the entire module.

A week is set aside in the study planner to complete each of these assessments.

Key point

The two parts of the online exam will only be available during study weeks 14 and 31. You must set aside time to complete them *during these specific weeks*, so you may wish to plan now when you will attempt them.

You can find more details on these assessment items in Section 3 of this guide.

2.5 Tutorial support

Approximately 1 unit of study time.

Tutorials in S284 have various purposes. Some are pre-recorded and presented as videos, while others are live events that occur in online meeting rooms.

In addition, tutorial support is embedded in the form of questions, examples and exercises in the topics, which all come with feedback and help you to understand and apply what you are learning (and are likely to be assessed on). Do not forget your S284 tutor is available to help and support your studies; you can find out more about this individualised support in Section 4 of this guide.

Pre-recorded video tutorials

In pre-recorded video tutorials, academics from the module team expand on ideas delivered within the topics, with their own knowledge and unique delivery style. These videos consist of several sections (or 'chapters') which you can select from an index in order to help you navigate or revisit them.

Each topic contains one 30–60 minute video, which you should study during the first week of the topic.

Live drop-in tutorials

There are 'question-and-answer' tutorials – or drop-in clinics – where someone is available to help you with your academic queries, no matter what they might be. During the module you will have the opportunity to participate in a number of drop-in clinics during each topic. They will be run by tutors (not necessarily your own) to provide support in your study of various aspects of the study material.

2.6 Other aspects of the module website

Approximately 1 unit of study time.

Some other key aspects of the module website are the `Forums`, `Resources` and `News` tabs – each of which is described below.

Forums

While studying S284 you can access a variety of module-based forums, as well as standard forums available to all OU students. You will find links to these on the interactive study planner, but they are also collected together for convenience in the `Forums` section.

You are encouraged to actively engage with the module-wide forum to discuss the scientific content you've been studying. You should visit it at least once a week and try and post comments or questions, and ask for help as and when you need it.

The forums are monitored by tutors and the module team, and sometimes your question can lead to help and support from (and for) other S284 students. (You'll recall that one of the learning outcomes for S284 is to 'Actively engage with the module community through contribution and participation'. One way of achieving this is through forums.)

As well as a module-wide forum there is a cafe forum, for informal chat and to meet other students. Additionally, your tutor will run a tutor-group forum for their own group of students.

Importantly, there is also a private forum that you can post queries to. Whatever is posted here will not be visible to any other students but will be seen by the module team, and a forum moderator will answer your query in confidence.

Key point

Note that the module forums will *close* during the weeks where you are completing the two parts of the online exam. Your tutor will still be contactable in other ways, and the private forum will be open for emergencies.

Resources

The module website provides links to other materials and resources that you will need for your studies. This includes information about the boot camp, the *Are You Ready For S284?* self-assessment quiz, the *Accessibility guide*, a printable version of this year's study calendar (as mentioned in Section 2.1 of this guide), a list of errata, the module glossary, and a PDF version of the *Extended Summaries Booklet*, among other things. You can access all of these via the `Resources` section.

News

Important updates about the module, reminders of key deadlines and events, and details of new errata are released via the `News` section. Such items appear in that section as appropriate, to provide timely and relevant information. You should check this area frequently (at least weekly) so you are aware of any last-minute updates to the module. (Remember, a full list of errata is also available from the `Resources` section.)

If you think you have found an error in any of the module materials you should first check the errata list to ensure it has not been previously documented. If you still feel that you have found a new error, you should contact your tutor with a full description.

2.7 The Extended Summaries Booklet

Approximately 1 unit of study time.

A key resource for your studies is the *Extended Summaries Booklet*. This contains a more detailed version of the summaries that appear at the end of each weekly part of the topics. It therefore pulls together all the key facts and concepts from the entire module, as well as the key tables, figures and diagrams. Furthermore, the booklet provides a collated list of the key equations in the module, a table of constants and conversion factors and a glossary.

However it is important to realise that you would *not* be able to pass this module by only studying the *Extended Summaries Booklet*. It is a summary of the key concepts and therefore exceptionally useful (and a permanent record of the material), but does not substitute for studying the whole module.

You should familiarise yourself with the booklet's contents and get used to using it as you work through the study material, for example to look up values for certain physical or astronomical constants needed to carry out calculations. It will be a vital resource when you come to sit the two parts of the online exam. You should plan to have it with you as you sit these assessments, and should study it carefully as part of your revision and exam preparation.

A PDF version of the booklet is available from the `Resources` section of the module website, and you may want to print off a copy and make your own notes on it.

Study note

In this first year of presentation of the module, starting in the autumn of 2020, the *Extended Summaries Booklet* will be available in two instalments. At the beginning of the module you will have access to a copy containing the summaries for Topics 1 to 3, and later we will send you a second (printed) version containing the summaries for the entire module.

3 Assessment

Approximately 1 unit of study time.

S284 has only one component of assessment. Your scores from *all* the assessment tasks you complete are used to calculate a single Overall Score. The assessment tasks on this module are described in the following sections and have the following weights:

- TMA 00, a dummy TMA that allows you to practise using the eTMA system to submit your tutor-marked assignments and to receive feedback on them: it does not count towards your Overall Score
- TMAs 01 to 06, *each* worth 8% of the Overall Score for this module
- Online Exam Part 1 (iCME 81), worth 12% of the Overall Score
- Online Exam Part 2 (iCME 82), worth 40% of the Overall Score.

Each TMA may be accessed from the `Assessment` section of the module website as well as the planner on the home page. The two parts of the online exam may also be accessed from the `Assessment` section, but will *only* be available during study weeks 14 and 31 respectively.

3.1 Tutor-marked assignments (TMAs)

Approximately 1 unit of study time.

The tutor-marked assignments for the module are spread throughout the year, and have cut-off dates that are given on both the study planner and the `Assessment` tab of the S284 website. Assignments should be submitted by these specified cut-off dates. The process for doing this is discussed in more detail below.

The TMAs are designed to provide you with regular, targeted feedback in order to help you learn and to assess your own progress towards meeting the learning outcomes. You are required to send answers to your tutor in response to questions that address the various concepts studied throughout S284. Your tutor will send you targeted feedback and advice on your answers, indicating how well they addressed the questions, and how they might be improved, if appropriate.

Each TMA is marked out of 32 marks in total, and is worth up to 8% of your Overall Score.

Completing your TMAs

Each of TMAs 01–06 contains typically two or three questions for you to complete. One or two of these will usually relate to exercises that you have completed in the preceding topic, and the question worth the largest number of marks will always be related to the activity for the topic.

You may wish to complete the TMA questions soon after you attempt the related exercises and activities in the associated topics, while the details are fresh in your mind. Alternatively, you may choose to wait until the fourth study week for each topic, where 3 hours of directed study are allocated to complete the TMA.

Submitting your TMAs

Your TMAs should be submitted as electronic documents through the OU's eTMA system, unless you have a disability which prevents you from doing so. In these circumstances, you must speak to the Disability Support Team to get their agreement to submit your assignment on paper.

The eTMA system allows you to submit assignments directly to the University 24 hours a day, and either gives you confirmation that your TMA has been submitted successfully or, if there has been a problem, an error message informing you of the problem and what steps you can take to overcome it.

Key point

Details of how to submit work electronically are given in the online Assessment Handbook, which can be found from the Student policies and regulations website. You are also given on-screen instructions when using the eTMA system.

You should note that in S284 it is expected that your TMAs will be submitted as Microsoft Office 365 Word files, in '.doc' or '.docx' file format. Further information on computing in S284 is given in Section 5 of this guide.

It is particularly important that you attempt a test submission of an assignment (TMA 00) before you come to submit TMA 01. This will not only enable you to familiarise yourself with the system but also allow your tutor to check that the format in which you will be saving your TMAs is compatible with their own computer software. It is your responsibility to make sure that you submit documents in the correct format. TMAs that are submitted incorrectly may not be marked.

Learning from your TMAs

Be sure to carefully study the TMA feedback that your tutor provides, and aim to learn from it before you submit your answers to the next assignment. Please don't just look at your score and ignore your tutor's useful advice!

3.2 The online exam

Approximately 1 unit of study time.

The two parts of the online exam will be answered under timed conditions at a computer in your own home (or other location arranged by you). Despite their formal name (interactive

computer-marked exam, iCME 81 and iCME 82), they will not be marked wholly by a computer, but they are delivered via the interactive computer-marked assignment (iCMA) system that you may be familiar with from other modules.

In fact, members of the module team will also mark the exam. Verification will be conducted to check that you are sitting the exam in person, and not submitting the work of another person. (That would constitute plagiarism, which the University considers a very serious offence.)

Online Exam Part 1 (iCME 81)

Online Exam Part 1 is of relatively low weight (12% of the Overall Score). It is designed to be a practice run for the second part of the online exam, and covers problem-solving skills from Topics 1–3. It *must* be attempted at the end of Topic 3, under timed conditions.

Part 1 of the online exam will be available for a period of *one week* (Week 14 in the study planner) and can be attempted at any time within that week. You will be given no other new material to study in that week, although you may wish to use some of the time for revision. The forums will also be closed for this week.

The effective length of time for answering the questions will be *1 hour*, but you will be permitted up to 3 hours after you open the exam to submit it. At the end of the set time, if you have not already submitted it, the online exam will automatically close and your existing answers will be submitted for scoring.

Please note, you will not receive your mark for Online exam part 1. You will receive your overall exam score following the Module Results Panel at the end of July.

Online Exam Part 2 (iCME 82)

Online Exam Part 2 is a high-weight assessment (40% of the Overall Score), and covers problem-solving skills from all the module topics (but especially Topics 4–7). It must also be completed under timed conditions.

Part 2 of the online exam will be available for a period of *one week* (Week 31 in the study planner) and can be attempted at any time within that week. It will operate in a similar way to the first part of the online exam.

The effective length in this case will be *3 hours*, but you will be permitted up to 6 hours after you open the exam to submit it. Again, at the end of the set time, if you have not already submitted it, the exam will automatically close and your current answers will be submitted for scoring.

Further information

Questions in each part of the online exam will include a mix of numerical answers, multiple response selection, drag-and-drop and free-text answers. Many of the answers will be computer-marked, but free-text answers and some others will be marked by the module team. You will be allowed one try at each question, but you can return to your response and amend it as many times as you wish prior to submission.

When you reach the end of the last scheduled study week, having completed the last materials for Topic 7, the following ‘review and assessment’ week will also include some advice about how to revise for Online Exam Part 2. Note, however, that you are the best judge of what you most need to revise, and how to go about it. The exam itself will be available the next week (study week 31).

Neither part of the online exam will require you to memorise material as you would for a traditional examination. You may have all your study materials to hand as you work. We

advise you to have your *Extended Summaries Booklet* (probably a printed copy, for ease of access) beside you as you complete the tests. However, bear in mind that constant searching and fact-checking is time-consuming so ensure you have prepared thoroughly for each part of the exam.

To give you some practice in answering this type of assignment, the module website includes a *Specimen online exam paper* (SEP), split into two parts (SEP 1 and SEP 2). These will function in a similar way and will contain similar questions, and an identical structure, to each part of the real online exam, but will *not* contribute to your Overall Score.

You are strongly recommended to use the SEP resources to familiarise yourself with both parts of the online exam, and to establish the level of detail required in your answers by referring to the accompanying specimen answers.

Box 1 A note on resits

We hope we have provided everything necessary to enable you to complete and pass S284 on the first attempt. But in the unlikely event of a resit being necessary, it is important to note that the resit for the module will require attempting both parts of the online exam (i.e. Online Exam Part 1 and Online Exam Part 2) under the same conditions as described above.

In other words, you would complete your resit exam:

- in your own home (or other location arranged by you)
- under timed conditions, with a total of 3 hours assigned for Part 1 and 6 hours assigned for Part 2.

Your final module result will then be determined by combining the marks from both parts of the online exam with your existing TMA scores, according to the percentage weighting for each element. Note that the final grade you will be awarded may be capped, as explained in the Assessment Handbook.

3.3 Your module result

Approximately 1 unit of study time.

Your Overall Score will be calculated from the sum of your scores on TMAs 01–06 (worth 8% each) and Online Exam Part 1 and Part 2 (worth 12% and 40%, respectively). You must attempt (i.e. open and submit) at least *one* of the parts of the online exam in order to be eligible to pass the module.

The pass mark for the module will normally be 40%, so it is *feasible* to obtain a mark that seems to give you a pass by completing all six TMAs well (giving a maximum score of 48%) and scoring nothing on either part of the online exam. However, if you do not

attempt at least one or both parts of the online exam you will not have completed the module, so you will not be eligible to pass it.

Key point

To achieve a bare pass (i.e. pass grade 4; see the Assessment Handbook) you must attempt at least one part of the online exam.

If you were to score full marks on the six TMAs and Online Exam Part 1, but did not attempt Online Exam Part 2, your maximum score would be 60% (i.e. pass grade 3) – but you would have to get near-perfect scores to manage this! To have a chance of achieving a pass grade 1 or 2, and so being well prepared for Level 3 study, you should attempt *all* the assessment components.

The S284 assessment model, and how this relates to your final module result is summarised in Figure 4.

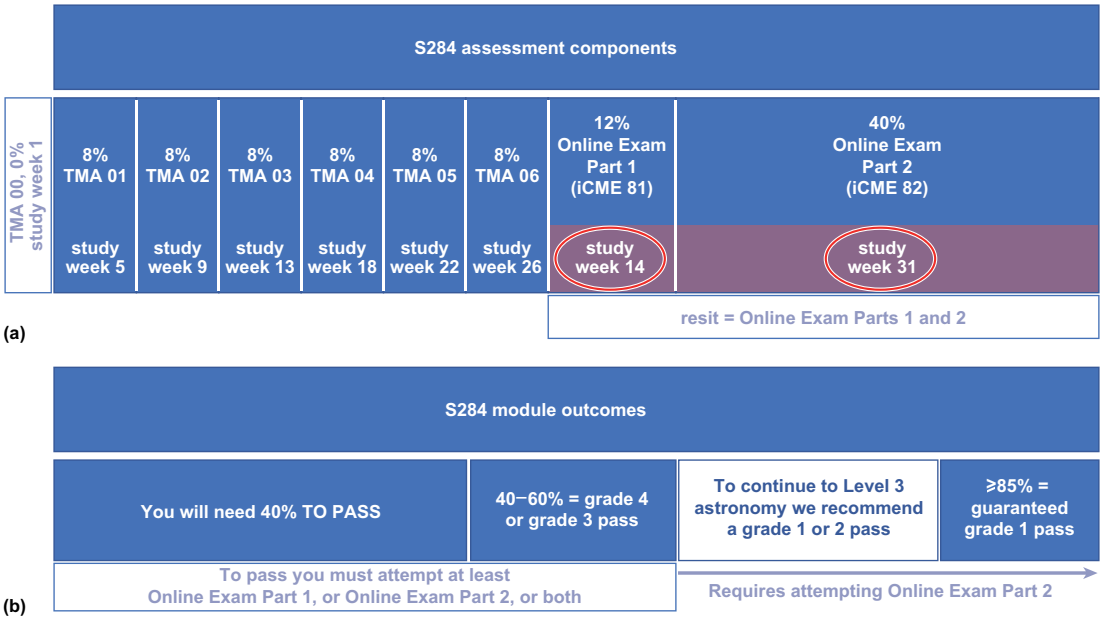


Figure 4 (a) The one component of assessment for S284 breaks down into seven TMAs (one of which, TMA 00, does not contribute to the final score) and an online exam in two parts. (b) How your cumulative score in the assessments leads to different overall module results.

Clearly, completing anything less than the full range of assessment components puts you at risk of not achieving even a bare pass if your marks are not sufficiently high on those assessment items that you do attempt.

- Is it possible to pass S284 by submitting answers to only the first three TMAs (TMA 01, 02, 03) and Online Exam Part 1?
- No. This would give a maximum score of (3 × 8%) + 12% = 36%, which is below the 40% pass mark.

- Is it possible to pass S284 by submitting answers to all the TMAs but omitting the online exam?
- No. Even though the maximum score you can reach by submitting all six TMAs is 6 × 8% = 48%, you will not be deemed to have completed the module if you do not engage with (i.e. open and submit) Online Exam Part 1 or Online Exam Part 2 (or preferably both parts of the online exam). If you do not attempt the exam you cannot pass S284.

- Is it possible to pass S284 by answering Online Exam Part 1 and Online Exam Part 2 but not submitting any TMAs?
- Yes, in theory you could pass S284 this way, but it is not advisable. The TMAs guide you through the module and help you to gauge your understanding of the material. They also provide a means for you to receive feedback on your progress from your tutor. They are therefore a vital element of engaging with the module through the year, rather than just at 'exam time'.

There may be a prize for the best-performing student in each presentation of the module.

3.4 Plagiarism and referencing

Approximately 1 unit of study time.

The OU is currently using text-comparison software to detect potential cases of plagiarism in work that is submitted for assessment. Please note the rubric at the beginning of each TMA, which highlights the importance of avoiding plagiarism in your work.

You can find useful information on the 'Developing good academic practice' website, which is available from the Referencing and plagiarism section of the OU Library Services website. (Note that this link is also available via the Assessment section on the module website.) This good-practice guide covers a range of topics including how and when to reference, the difference between collusion and collaboration, and writing in your own words.

S284 uses a referencing style called 'Cite Them Right', which is also available from the Referencing and plagiarism page of the OU Library Services website. If you include materials in your assessed work which are not your own, either from the internet or copied from print sources, then you should reference them appropriately, so it is clear that it is not your own work.

3.5 Deferrals and postponements

We recognise that some students studying S284 may need or wish to pause their studies. Further information, and definitions of the words in bold below, can be found in the Assessment and Exams section of the Help Centre. Note the following specific

information that applies to S284, and may override the more general information in those documents.

Assessment banking is not permitted on S284.

Deferrals must be formally requested and in process before midnight on the Friday at the end of study week 30, i.e. before the Online Exam Part 2 opens. Deferring to a future presentation will mean that you will start all S284 assessment from scratch.

If you cannot attempt the Online Exam Part 2 due to circumstances beyond your control, such as illness or bereavement, and you can provide third party documentary evidence of those circumstances, you may be exceptionally permitted to postpone Online Exam Part 2 to the next opportunity for your module. This process is called **Discretionary Postponement**. Note that a Discretionary Postponement cannot be requested after midnight on the Friday at the end of study week 30, i.e. before the Online Exam Part 2 opens. You will *not* be allowed to request a postponement in study week 31.

If an emergency arises in week 31 which impacts on your ability to submit your best work for the exam, you should talk to your tutor or the Student Support Team and submit a special circumstances form, as detailed elsewhere.

4 Study support

Approximately 1 unit of study time.

You will receive support from the module team and your assigned tutor in a number of ways.

Your tutor will be your main point of contact and will provide you with academic support. You may contact your tutor by email or phone with any queries that you might have about the module, and you are strongly encouraged to do so. Your tutor will also mark your assignments.

In addition to providing you with individual support, your tutor will lead an online tutor-group forum. You will also have access to module-wide tutorials (i.e. ‘drop-in’ tutorial clinics run in online rooms that allow real-time collaboration) and module-wide forums. These were described in Section 2 of this guide.

The rationale for using online tuition is to provide as much opportunity as possible for students to interact directly with, and benefit from, experienced academic support. It is also analogous to the way in which professional scientists often work in large international collaborations, which rely heavily on electronic communication rather than face-to-face discussion. Therefore, the skills that you develop through online tuition are those that are needed to practise science in the modern world.

Forums are available at any time and are what is known as asynchronous communication. Online sessions occur at specific times and will not be recorded. You will receive notification of the times of the online tuition sessions at the start of the module.

5 Computing

Approximately 1 unit of study time.

Most of S284 is delivered online and requires you to use information and communication technologies. The study materials (including videos, audio tracks and interactive diagrams and exercises) are organised through the module website. Without access to a computer and the internet, you will not be able to engage in the full S284 study experience.

The activity for each topic also relies on computer software and leads on to the TMA for that topic. These activities will not require you to undertake coding or be a computing expert, but you will need some familiarity with computers and computing skills to complete the module successfully.

Most importantly, the two parts of the exam for the module are delivered online and are each available to sit during a specific week, as indicated in the interactive study planner on the module website.

Key point

It is imperative that you have access to a computer and the internet to enable you to sit Online Exam Part 1 (study week 14, in January) and Online Exam Part 2 (study week 31, in May). It is not possible to sit the two parts of the S284 exam outside these periods.

5.1 What computing skills and equipment will I need?

Approximately 2 units of study time.

You will need to be comfortable with the following things to ensure you can complete S284 successfully.

- You will need to access the module website regularly: on at least a weekly basis, and given that all the module materials are online, probably more often than this.
- The module website includes a variety of embedded tutorial support provided in video, audio and other interactive formats. To use these you will need to be able to use mouse and keyboard functions and/or play video and audio on your computer equipment.
- You will be expected to use online systems (such as Adobe Connect) to interact with other students and tutors through the ‘drop-in’ tutorials (and individual or small group

sessions when offered), and to have the appropriate audio/keyboard accessories with your computer to do so.

- You are encouraged to engage with the peer community through the module forum as a source of communication with other students and tutors. This may be by posting to the forum, answering the queries of others, or simply reading the posts.
- You will use email (and sometimes tutor-group forums) to communicate with your tutor. (This contact may also happen via the telephone, but this may or may not be computer-based.)
- You are advised to use (by reading or subscribing) the News feed for the module regularly (i.e. weekly), so that you are up to date with important information and reminders from the module team.
- You will need to submit your TMAs electronically using the eTMA system, in '.doc' or '.docx' format (produced, for example, in Microsoft Word). In addition, some activities (and the associated TMAs) require the use of spreadsheet, presentation or word-processing programs to model, understand or demonstrate various astronomical phenomena. All OU students have access to Microsoft Office 365, and we recommend that you make use of the free access to this software package, which works across Windows, Mac OS and Linux operating systems. (Search the Help Centre for 'Microsoft Office 365' to find out how to access this software suite.)
- In addition to Office 365 requirements, some topic activities and TMAs will require you to use professional astronomy software. This software may need to be downloaded and installed on your computer (not a mobile device such as a phone or tablet), or it will need to be accessed via a website. You will also be required to use internet search engines to gather data, and OU Library Services to search for astronomy literature.
- The two parts of the online exam make use of the OU iCMA system, and so you need to have access to a computer (not a mobile phone or tablet) connected to the internet, to enable you to complete each one. *It is imperative that you have access to a computer and the internet to enable you to sit Online Exam Part 1 (study week 14, in January) and Online Exam Part 2 (study week 31, in May)*.
- You will access StudentHome regularly for help and support with your studies.
- You may wish to install various other third-party software packages. You can access these via the Software downloads and discounts section of the Computing Guide. Each of these items can be installed separately on your computer in the same way as other software you may have installed. For S284, you may wish to download and install Adobe Reader for reading PDF files.

Box 2 A note on decimal-point settings

Two different conventions are used around the world for separating the integer and decimal digits in a number. In the UK and USA, the decimal point '.' is used, whereas in continental Europe, the decimal comma ',' is the convention. All OU software components adopt the former convention. This can cause computers that are configured for continental Europe to misinterpret data supplied in the OU software materials – particularly in Microsoft Office applications.

To avoid this potential problem, if your computer is normally configured to use the comma as the decimal marker you are advised to change your configuration when you are running OU software or using spreadsheets supplied by The OU. This is easy to do and can be changed back to your preferred setting as soon as you stop working on OU materials. To check and/or change your computer's decimal marker

(on PCs running Windows), follow the steps below. Note that the procedure will differ slightly depending on which version of Windows you are running.

1. Go to the Start button, then Control Panel | Regional and language options
2. From the Regional Options tab, write down the setup currently being used (for future reference), select English (United Kingdom) from the drop-down list and click on OK.

After using the OU software, you may wish to use a similar procedure to revert to your original setting.

5.2 Where can I get computing support?


Approximately 2 units of study time.

The OU has a dedicated Computing Guide, which can be accessed from your StudentHome page (or by clicking the Help? icon at the top of any page on the module website). It provides information about the various online systems and tools at your disposal as an OU student.

Additionally, there are numerous computing help tips on the Help Centre website, and a Computing Helpdesk (see the Help and Support section of the Computing Guide). The Helpdesk can help you with any computing problems you are unable to solve from the generic information provided, for example with Office 365, literature searches, search engines or email queries.

However, the module-specific software used in the activities in Topic 1 (TOPCAT) and Topic 3 (JS9) of S284 are not supported by the Helpdesk. For assistance with TOPCAT and JS9 you should contact your S284 tutor and/or look (or ask) on the module-wide forum, where module-specific peer and tutor support will be provided.

Box 3 Contacting the Computing Helpdesk

There are three ways to contact the Computing Helpdesk:

- Live Chat
- Telephone: +44 (0)1908 653972 Monday to Friday 09:00–21:30, Saturday and Sunday 09:00–17:00. Open most bank holidays 10:00–16:00. Closed Christmas Day, Boxing Day, New Year's Day and Easter Sunday.
- Email.

Expect a response to emailed queries within 3 to 5 working days.

If after reading this section you are concerned about how the online delivery of S284 may impact you individually, now is the time to raise this. It may be that you have already told The OU about any additional needs you may have, but even if you have not, the S284 Accessibility guide is a very good place to start to answer your questions. Please take a look at the guide now if you have not already done so.

As a module team we have tried hard to make reasonable adjustments where possible to module materials so that S284 can be as widely accessible as possible. Astronomy is a very visual science, so at times this can be challenging. Further details are provided in the *Accessibility guide* but briefly you will find that:

- All videos are transcribed and subtitled (unless we link out to external videos such as those hosted on YouTube). Longer videos have chapter markers to ease navigation.
- All audio has a transcript provided.
- Figure descriptions have been provided (where possible).
- The module materials can be downloaded in ebook, PDF, and Word (optimised for screen reader) versions for offline working, but as a module team we would stress that this negates the additional interactive understanding that you would benefit from by studying online.
- The pencils symbols guide you to the individual study time required for each section of module materials, including TMAs, tutorials and activities.

Obviously, every student is an individual and has slightly different circumstances, so if you still think there may be an issue (or find an issue), please contact your S284 tutor as soon as possible to explain your concerns. Your tutor may be able to alleviate the issue, or may redirect you to the Student Support Team (SST) or the Disability Support team (DST), who will then be able to advise you further. The StudentHome pages have significant details of the Disability Support available through The OU, and the module team are happy to work with the SST and DST to find reasonable adjustments that enable students to complete S284 successfully.

Finally, if you feel you need to enhance your computing skills, advice is offered on StudentHome, but also in the boot camp (which occurs in the two weeks prior to the official module start). Even if the boot camp is now finished, the materials will be available throughout this study year, and can be accessed at any time via the `Resources` section on the module website.

It is a very good idea to use some of your self-directed study time to build your computing confidence, as familiarity with computers and software will help you to make more productive use of your study time overall.

6 Contact points

Approximately 2 units of study time.

There are four main points of contact for queries associated with your S284 studies. Whom you contact depends on the nature of the issue, but in general you would:

1. approach your tutor
2. approach the Student Support Team (SST)
3. use the HelpDesk via StudentHome (and Computing HelpDesk) or
4. contact the module team.

Module points of contact

On S284, tutors have significant time to assist and support students through personal contact, by phone or email, and/or small group or individual tutorial work in tutor-group forums. If your question/comment is something personal, or if it relates to an S284 assignment, your tutor is your first point of contact.

For other questions or comments related to S284, we suggest you post a message on the module forum, or use the private forum (which can be seen by *some* of the module team, but not other students).

This guide is also a valuable reference source, which should contain answers to most of the general queries you might have about studying S284 with The OU. You certainly should refer back to it during the module.

General points of contact

The best way to contact The OU for virtually all sources of help is via StudentHome. There is a comprehensive Help Centre with links to a number of helpful OU websites and to a Contact the OU page. Follow this option to open up a page with various contact details organised under headings that may reflect what your query is about.

Box 4 Want to speak to an adviser? Call us

As an Open University student, you can contact an adviser at your Student Support Team (SST) using the contact details that you will find on StudentHome. Please do call us and ask so we can support you.

Feedback to the S284 Module Team

We welcome your comments about S284, whether positive or negative.

The best way to contact the module team is to post your query on the main S284 forum. But, if your question or comment is more personal, or not something you wish to make

public, you can also use the S284 private forum. You can also email or call your tutor to give comments – they will pass these on (anonymously if need be) to the central module team.

Alternatively, email OU-Science@open.ac.uk. Please quote the module code, S284, in the subject field, and make sure you include your Personal Identifier (PI) number in the body of the message.

7 What to do next

You have almost completed the first week of S284: well done! The final important task for this week is to complete TMA 00. We also have suggested a checklist of things to prepare in your self-directed study time this week.

7.1 TMA 00

Approximately 2 units of study time.

TMA 00 is a dummy TMA covering study skills related to TMA preparation and submission, and use of the eTMA submission system. It does not count towards your Overall Score.

Why should I complete TMA 00?

Submitting TMA 00 gives you the opportunity to practise many of the key word-processing skills you will be asked to use in future TMAs (e.g. inserting equations, tables and diagrams, and including graphs). Students completing TMA 00 gain confidence before TMA 01, and consequently are likely to score higher in that and subsequent TMAs (marks which count towards your final module score).

The process also alleviates any difficulties you may face in TMA preparation and submission, without affecting your final module score. The submission gives you experience of using the eTMA system and receiving your assignment back from your tutor.

TMA 00 requires no calculations or working out. Most of the material needed to answer the questions can be found on the module website.

This exercise also gives you an opportunity to create your own template TMA submission file for use in future TMA submissions on S284. Your tutor's feedback on this TMA will identify if information is missing in your TMA, or if information is included that is not required, again to help you with preparing future submissions.

Your submission must be made as a Microsoft Office Word document in '.doc' or '.docx' format, and include your name, PI number, module code and TMA number.

Submitting, receiving back, and reviewing your TMA 00

You should submit your dummy TMA 00 assessment via the `eTMA system` link in the module block on StudentHome. Click on the `submit` button and full instructions will appear. Further information about how to submit your TMA using the eTMA system is given in the Assignments section of the Help Centre and in the Assessment Handbook (both of which you can also access via StudentHome).

Your tutor will review and return your TMA 00 to you with light-touch feedback. This will focus mostly on the style of presentation and demonstration of key skills that will be required from future TMA submissions, rather than scientific comments. You can collect your reviewed TMA 00 via the same `eTMA system` link in the module block on StudentHome, by clicking on the `collect` button.

It is vital you collect and read the TMA 00 feedback, as it will help you prepare for TMA 01 and future TMAs. The feedback from your tutor will come in '.doc' or '.docx' format as well, with comments added onto your TMA submission and a separate Assessment Summary. Ensure you download, open and read *both* documents. A model TMA 00 answer will be available to those submitting TMA 00. You should note down any specific feedback your tutor gives you from TMA 00 and use it when preparing TMA 01 and subsequent TMAs.

Your tutor may suggest you look at study skills materials, or background maths and physics materials to help with S284, particularly those of most relevance in the boot camp.

Usually in TMAs, your solutions should be your own work and should not therefore contain downloaded text equations or diagrams from the internet or material copied from any text sources. In TMA 00 we specifically ask you to copy such material, as we are testing skills and not science. You should use appropriate referencing at all times though. If you are not clear how to reference articles, web access or books and documents, look at the OU plagiarism advice in the Developing Good Academic Practice resource, and Section 3.4 of this guide.

Key point

Go to the `Assessment` section to locate TMA 00. We recommend that you complete and submit TMA 00 *now*.

7.2 Checklist for self-directed study time in Week 1

Approximately 2 units of study time.

You'll recall that your S284 study time should be at least 10 hours a week, 60% of which is directed by the module team, and 40% reserved for your own self-directed study.

Usually, as a module team, we will not be giving you any advice on how to spend this self-directed study time, but for this first week there are a few things to check that you have done, and if necessary look back at, before the module starts in earnest in Week 2. It might be a good idea to use your self-directed study time for these tasks.

1. Review the interactive study planner and print off the Summary study calendar PDF. Put it up somewhere you can see it and refer to it!
2. Note the dates that your TMA assignments are due.
3. Note the weeks where the two parts of the online exam are open. These cannot be changed. *Ensure that you will be able to complete each of the two parts of the online exam in study week 14 (in January) and study week 31 (in May)*. Remember that the *Online Exam Part 1 has an expected 1-hour duration* and *Online Exam Part 2 has an expected 3-hour duration*.
4. Think again about how the time required to study S284 fits with your other commitments. Make sure you have the time to study S284 – the module has a regular workload of 6 hours of directed learning per week, plus an expectation of 4 hours of self-directed study.

5. All the module-wide S284 drop-in tutorials take place in the second week of each topic. There are seven of these tutor-led tutorials in total. Book now for either the evening, day-time or weekend tutorial slot for each topic, and put those seven dates in your diary. By booking the tutorials you can request that they also appear in your online study planner.
6. Look back at the boot camp resources and study support. Evidence from previous Level 2 astronomy modules shows that students who use and engage with the boot camp materials obtain, on average, higher marks in their TMAs than those who do not.
7. Ensure you have made contact with your S284 tutor, by email or phone, and that you know how to contact them if you are stuck.
8. Check you can navigate around this module website.
    - If you have not already done so, introduce yourself to your fellow students using the cafe forum.
    - Check that you can also find your tutor-group forum, the module-wide forum, and in case you should need it, the private forum.
    - Check that you can find all the online study materials, topic by topic, and set up your computer to be able to watch videos and listen to audio, as well as to read materials, and to attempt questions and exercises. Familiarise yourself with the navigation tabs, headings and buttons to change pages.
    - Check you can access the `Assessment` section and see the TMAs, online exam links (greyed out unless open), and the Specimen Online Exam Papers (SEP).
9. Check that you have located the *Extended Summaries Booklet* in the `Resources` section. Note that the full S284 *Extended Summaries Book*, covering Topics 1–7 will be mailed early in the New Year.
10. Double check that your computing needs are set up, including:
    - that you have bookmarked the module website on your internet browser
    - that you have access to Microsoft Word, PowerPoint and Excel in Office 365
    - that you can email your tutor (and vice versa)
    - that you can use the eTMA system (by submitting TMA 00)
    - that you have downloaded and can use the online rooms software system for tutorial participation.

8 Final words

This guide has covered all the significant details about studying S284. It is a useful resource to refer back to during the module if you have questions.

In Week 2 you'll start to study astronomy, beginning with Topic 1 Cosmic length scales, which looks at the sizes of, and distances to, astronomical objects. This topic sets the scene and understanding for the remainder of S284, and we really hope you'll enjoy studying astronomy with us.

Acknowledgements

Grateful acknowledgement is made to the following sources.

Video 1: H–R diagram, adapted from Seeds, M. A. (1984) *Foundations of Astronomy*, Thompson Learning (Global Rights Group; image of the Milky Way from above, NASA/JPL-Caltech/R. Hurt (SSC/Caltech); image of the Milky Way in side-on view, ESO/S. Brunier, used under https://creativecommons.org/licenses/by/4.0/; animation of interacting binary star, © Mark A. Garlick, www.space-art.co.uk.

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