

# Subject CP2

## 2021 Study Guide

### Introduction

This Study Guide has been created to help guide you through Subject CP2. It contains all the information that you will need before starting to study Subject CP2 for the 2021 exams and you may also find it useful to refer to throughout your Subject CP2 journey.

The guide is split into two parts:

- Part 1 contains general information about the Core Principles subjects
- Part 2 contains specific information about Subject CP2.

**Please read this Study Guide carefully before reading the Course Notes**, even if you have studied for some actuarial exams before.

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## 1.1 Before you start

When studying for the UK actuarial exams, you will need:

- a copy of the **Formulae and Tables for Examinations of the Faculty of Actuaries and the Institute of Actuaries, 2nd Edition (2002)** – often referred to simply as the *Tables*
- a ‘permitted’ **scientific calculator** – you will find the list of permitted calculators on the profession’s website. Please check the list carefully, since it is reviewed each year.

These are both available from the Institute and Faculty of Actuaries’ eShop. Please visit **[www.actuaries.org.uk](http://www.actuaries.org.uk)**.

## 1.2 Core study material

This section explains the role of the Syllabus and ActEd material. It also gives guidance on how to use these materials most effectively in order to pass the exam.

### Syllabus

The Syllabus for Subject CP2 has been produced by the Institute and Faculty of Actuaries. The relevant individual Syllabus Objectives are included at the start of each course chapter and a complete copy of the Syllabus is included in Section 2.2 of this Study Guide. We recommend that you use the Syllabus as an important part of your study.

### Background reading and Guide to CP2

There is no Core Reading for CP2. However, the Institute and Faculty of Actuaries produce background reading for this subject, which can be found in *A Guide to CP2 Modelling Practice* available on the IFoA website:

**[www.actuaries.org.uk](http://www.actuaries.org.uk)**

Students should ensure that they have read and understood the background reading before their CP2 examination.

*A Guide to CP2 Modelling Practice* also includes more detailed information relating to the CP2 exam, including the objectives and format of the exam and links to sample projects.

### ActEd text

All of the CP2 Course Notes are ActEd material, in that students would not be expected to quote the material in the examination. It is intended to support the syllabus and background reading published by the IFoA.

### Copyright

All study material produced by ActEd is copyright and is sold for the exclusive use of the purchaser. The copyright is owned by Institute and Faculty Education Limited, a subsidiary of the Institute and Faculty of Actuaries. Unless prior authority is granted by ActEd, you may not hire out, lend, give out, sell, store or transmit electronically or photocopy any part of the study material. You must take care of your study material to ensure that it is not used or copied by anybody else.

*Legal action will be taken if these terms are infringed. In addition, we may seek to take disciplinary action through the Institute and Faculty of Actuaries or through your employer.*

These conditions remain in force after you have finished using the course.

## 1.3 ActEd study support

This section gives a description of the products offered by ActEd.

Successful students tend to undertake three main study activities:

1. *Learning* – initial study and understanding of subject material
2. *Revision* – learning subject material and preparing to tackle exam-style questions
3. *Rehearsal* – answering exam-style questions, culminating in answering questions at exam speed without notes.

Different approaches suit different people. For example, you may like to learn material gradually over the months running up to the exams or you may do your revision in a shorter period just before the exams. Also, these three activities will almost certainly overlap.

We offer a flexible range of products to suit you and let you control your own learning and exam preparation. The following table shows the products that we produce. Note that not all products are available for all subjects.

LEARNING	LEARNING & REVISION	REHEARSAL
Course Notes	X Assignments	Mock Exam
	Combined Materials Pack (CMP)	Additional Mock Pack (AMP)
	X Assignment Marking	Mock Marking
	Tutorials	
	Online Classroom	

The products and services are described in more detail below.

## **‘Learning’ products**

### ***Course Notes***

The Course Notes will help you develop the basic knowledge and understanding of principles needed to pass the exam. They include full explanation of all the syllabus objectives, with worked examples and questions to test your understanding.

Each chapter includes:

- the relevant syllabus objectives
- a chapter summary
- practice questions with full solutions.

## **‘Learning & revision’ products**

### ***X Assignments***

The Series X Assignments can be used to both develop and test your understanding of the material.

### ***Combined Materials Pack (CMP)***

The Combined Materials Pack (CMP) comprises the Course Notes and the Series X Assignments.

The CMP is available in **eBook** format for viewing on a range of electronic devices. eBooks can be ordered separately or as an addition to paper products. Visit [www.ActEd.co.uk](http://www.ActEd.co.uk) for full details about the eBooks that are available, compatibility with different devices, software requirements and printing restrictions.

### ***X Assignment Marking***

We are happy to mark your attempts at the X assignments. Marking is not included with the Assignments or the CMP and you need to order it separately. You should submit your script by email. Your script will be marked electronically and you will be able to download your marked script via a secure link on the internet.

Don't underestimate the benefits of doing and submitting assignments:

- Question practice during this phase of your study gives an early focus on the end goal of answering exam-style questions.
- You're incentivised to keep up with your study plan and get a regular, realistic assessment of progress.
- Objective, personalised feedback from a high quality marker will highlight areas on which to work and help with exam technique.

In a recent study, we found that students who attempt more than half the assignments have significantly higher pass rates.

There are two different types of marking product: Series Marking and Marking Vouchers.

### *Series Marking*

Series Marking applies to a specified subject, session and student. If you purchase Series Marking, you will **not** be able to defer the marking to a future exam sitting or transfer it to a different subject or student.

We typically send out full solutions with the Series X Assignments. However, if you order Series Marking at the same time as you order the Series X Assignments, you can choose whether or not to receive a copy of the solutions in advance. If you choose not to receive them with the study material, you will be able to download the solutions via a secure link on the internet when your marked script is returned (or following the final deadline date if you do not submit a script).

If you are having your attempts at the assignments marked by ActEd, you should submit your scripts regularly throughout the session, in accordance with the schedule of recommended dates set out in information provided with the assignments. This will help you to pace your study throughout the session and leave an adequate amount of time for revision and question practice.

The recommended submission dates are realistic targets for the majority of students. Your scripts will be returned more quickly if you submit them well before the final deadline dates.

Any script submitted *after* the relevant final deadline date will not be marked. It is your responsibility to ensure that we receive scripts in good time.

### *Marking Vouchers*

Marking Vouchers give the holder the right to submit a script for marking at any time, irrespective of the individual assignment deadlines, study session, subject or person.

Marking Vouchers can be used for any assignment. They are valid for four years from the date of purchase and can be refunded at any time up to the expiry date.

Although you may submit your script with a Marking Voucher at any time, you will need to adhere to the explicit Marking Voucher deadline dates to ensure that your script is returned before the date of the exam. The deadline dates are provided with the assignments.

### **Tutorials**

Our tutorials are specifically designed to develop the knowledge that you will acquire from the course material into the higher-level understanding that is needed to pass the exam.

We run a range of different tutorials including face-to-face tutorials at various locations, and Live Online tutorials. Full details are set out in our *Tuition Bulletin*, which is available on our website at **[www.ActEd.co.uk](http://www.ActEd.co.uk)**.

### *Preparation Days*

For Subject CP2 we offer a one-day Preparation Day. In advance of the tutorial day, we expect you to have read the Course Notes so that the group can spend time on discussion to develop understanding.

## ***Online Classroom***

The Online Classroom acts as either a valuable add-on or a great alternative to a face-to-face or Live Online tutorial.

At the heart of the Online Classroom in each subject is a comprehensive, easily-searched collection of tutorial units. For Subject CP2, the Online Classroom follows a very similar structure to the Preparation Day.

The best way to discover the Online Classroom is to see it in action. You can watch a sample of the Online Classroom tutorial units on our website at [www.ActEd.co.uk](http://www.ActEd.co.uk).

## **‘Rehearsal’ products**

### ***Mock Exam***

The Mock Exam consists of two 100-mark mock exam papers (one for Paper 1 and one for Paper 2) that provide a realistic test of your exam readiness.

### ***Additional Mock Pack (AMP)***

The Additional Mock Pack (AMP) consists of four further 100-mark mock exam papers – Mock Exam 2 (Paper 1 and Paper 2) and Mock Exam 3 (Paper 1 and Paper 2). This is ideal if you are retaking this subject and have already sat the Mock Exam, or if you just want some extra question practice.

### ***Mock Marking***

We are happy to mark your attempts at the mock exams. The same general principles apply as for the X Assignment Marking. In particular:

- Mock Exam Marking applies to a specified subject, session and student. In this subject it covers the marking of both papers.
- Marking Vouchers can be used for each mock exam paper. Marking vouchers have to be used for the AMP mocks and can also be used for marking the Mock Exam. Note that you will need two marking vouchers in order to have both Paper 1 and Paper 2 marked.

Recall that:

- marking is not included with the products themselves and you need to order it separately
- you should submit your script by email in the format detailed in the mock exam instructions
- your script will be marked electronically and you will be able to download your marked script via a secure link on the internet.

## 1.4 Study skills

### The Subject CP2 exams

In testing your ability to communicate clearly rather than to recall and apply technical knowledge, Subject CP2 is very different to the other actuarial exams. Your approach to study and preparation for the examination may also be quite different. Learning to communicate effectively is a gradual process – you will need to practise a great deal and be open to constructive criticism.

The aim of the Subject CP2 exams is to ensure that students can model data, document their work, analyse results and communicate the approach, results and conclusions. Some of these areas may take a lot of practice for you to develop the necessary skills to demonstrate to the examiners in order to pass the exam.

### Study skills

#### *Overall study plan*

We suggest that you develop a realistic study plan, building in time for relaxation and allowing some time for contingencies. Be aware of busy times at work, when you may not be able to take as much study leave as you would like. Once you have set your plan, be determined to stick to it. You don't have to be too prescriptive at this stage about what precisely you do on each study day. The main thing is to be clear that you will cover all the important activities in an appropriate manner and leave plenty of time for revision and question practice.

Aim to manage your study so as to allow plenty of time for the concepts you meet in this course to 'bed down' in your mind. Most successful students will probably aim to complete the course at least six weeks before the exam, thereby leaving a sufficient amount of time for revision. By finishing the course as quickly as possible, you will have a much clearer view of the *big picture*. It will also allow you to structure your revision so that you can concentrate on the important and difficult areas of the course.

You can also try looking at our discussion forum on the internet, which can be accessed at [www.ActEd.co.uk/forums](http://www.ActEd.co.uk/forums) (or use the link from our home page at [www.ActEd.co.uk](http://www.ActEd.co.uk)). There are some good suggestions from students on how to study.

#### *Study sessions*

Only do activities that will increase your chance of passing. Try to avoid including activities for the sake of it and don't spend time reviewing material that you already understand. You will only improve your chances of passing the exam by getting on top of the material that you currently find difficult.

Ideally, each study session should have a specific purpose and be based on a specific task, eg 'Finish reading Chapter 3 and attempt Practice Questions 1.4, 1.7 and 1.12', as opposed to a specific amount of time, eg 'Three hours studying the material in Chapter 3'.



Try to study somewhere quiet and free from distractions (*eg* a library or a desk at home dedicated to study). Find out when you operate at your peak, and endeavour to study at those times of the day. This might be between 8am and 10am or could be in the evening. Take short breaks during your study to remain focused – it's definitely time for a short break if you find that your brain is tired and that your concentration has started to drift from the information in front of you.

### ***Order of study***

We suggest that you work through each of the chapters in turn. To get the maximum benefit from each chapter you should proceed in the following order:

1. Read the Syllabus Objectives. These are set out in the box at the start of each chapter.
2. Read the Chapter Summary at the end of each chapter. This will give you a useful overview of the material that you are about to study and help you to appreciate the context of the ideas that you meet.
3. Study the Course Notes in detail, annotating them and possibly making your own notes. Try the self-assessment questions as you come to them. As you study, pay particular attention to the listing of the Syllabus Objectives.
4. Read the Chapter Summary again carefully. If there are any ideas that you can't remember covering in the Course Notes, read the relevant section of the notes again to refresh your memory.
5. Attempt the Practice Questions that appear at the end of the chapter.

It's a fact that people are more likely to remember something if they review it several times. So, do look over the chapters you have studied so far from time to time. It is useful to re-read the Chapter Summaries or to try the Practice Questions again a few days after reading the chapter itself. It's a good idea to annotate the questions with details of when you attempted each one. This makes it easier to ensure that you try all of the questions as part of your revision without repeating any that you got right first time.

Once you've read the relevant chapters of the Course Notes and attempted the Practice Questions you should attempt the assignments. If you submit your assignment for marking, spend some time looking through it carefully when it is returned. It can seem a bit depressing to analyse the errors you made, but you will increase your chances of passing the exam by learning from your mistakes. The markers will try their best to provide practical comments to help you to improve.

To be really prepared for the exam, you should be aware of what the examiners will expect. Your revision programme should include plenty of question practice so that you are aware of the typical style, content and marking structure of exam questions. You should attempt as many past exam questions as you can.

As ActEd tutors, it is very illuminating to see/hear how different students study for the exams. We hear quite a few students make comments such as:

- Assignment questions are not relevant to the exam.
- It's quicker just to read through the assignment questions and solutions.
- There isn't enough time to get the assignments done.

Sound familiar?

It may be worth thinking again for Subject CP2 as, when we look at the pass lists, we are finding that there is a correlation between students who are making the effort to do assignment, mock exam and past exam questions, and those who are happy on exam results day.

### **Active study**

Here are some techniques that may help you to study actively.

1. Don't believe everything you read! Good students tend to question everything that they read. They will ask 'why, how, what for, when?' when confronted with a new concept, and they will apply their own judgement. This contrasts with those who unquestioningly believe what they are told, learn it thoroughly, and reproduce it (unquestioningly?) in response to exam questions.
2. Another useful technique as you read the Course Notes is to think of possible questions that the examiners could ask. This will help you to understand the examiners' point of view and should mean that there are fewer nasty surprises in the exam room! Use the Syllabus to help you make up questions.
3. Annotate your notes with your own ideas and questions. This will make you study more actively and will help when you come to review and revise the material. Do not simply copy out the notes without thinking about the issues.
4. Attempt the questions in the notes as you work through the course. Write down your answer before you refer to the solution.
5. Attempt other questions and assignments on a similar basis, *ie* write down your answer before looking at the solution provided. Attempting the assignments under exam conditions has some particular benefits:
  - It forces you to think and act in a way that is similar to how you will behave in the exam.
  - When you have your assignments marked it is *much* more useful if the marker's comments can show you how to improve your performance under exam conditions than your performance when you have access to the notes and are under no time pressure.
  - The knowledge that you are going to do an assignment under exam conditions and then submit it (however good or bad) for marking can act as a powerful incentive to aid your studies.
  - It is quicker than trying to write perfect answers.

6. Sit a mock exam four to six weeks before the real exam to identify your weaknesses and work to improve them. You could use an ActEd Mock Exam, past exam papers and/or the specimen exam paper.

You can find further information on how to study in the profession's Student Handbook, which you can download from their website at:

**[www.actuaries.org.uk/studying](http://www.actuaries.org.uk/studying)**

## 1.5 Queries and feedback

### Questions and queries

From time to time you may come across something in the study material that is unclear to you. The easiest way to solve such problems is often through discussion with friends, colleagues and peers – they will probably have had similar experiences whilst studying. If there's no one at work to talk to then use our discussion forum at [www.ActEd.co.uk/forums](http://www.ActEd.co.uk/forums) (or use the link from our home page at [www.ActEd.co.uk](http://www.ActEd.co.uk)).

Our online forum is dedicated to actuarial students so that you can get help from fellow students on any aspect of your studies. ActEd Tutors will visit the site from time to time to ensure that you are not being led astray and we also post other frequently asked questions from students on the forum as they arise.

If you are still stuck, then you can send queries by email to [CP2@bpp.com](mailto:CP2@bpp.com) (but we recommend that you try the forum first). We will aim to reply as soon as possible after receiving your query but you should be aware that it may take some time to reply to queries, particularly when tutors are away from the office running tutorials. At the busiest teaching times of year, it may take us more than a week to get back to you.

If you have many queries on the course material, you should raise them at a tutorial or book a personal tuition session with an ActEd Tutor. Information about personal tuition is set out in our current brochure. Please email [ActEd@bpp.com](mailto:ActEd@bpp.com) for more details.

### Feedback

If you find an error in the course, please check the corrections page of our website ([www.ActEd.co.uk/paper\\_corrections.html](http://www.ActEd.co.uk/paper_corrections.html)) to see if the correction has already been dealt with. Otherwise please send details via email to [CP2@bpp.com](mailto:CP2@bpp.com).

Each year our tutors work hard to improve the quality of the study material and to ensure that the courses are as clear as possible and free from errors. We are always happy to receive feedback from students, particularly details concerning any errors, contradictions or unclear statements in the courses. If you have any comments on this course please email them to [CP2@bpp.com](mailto:CP2@bpp.com).

Our tutors also work with the profession to suggest developments and improvements to the Syllabus. If you have any comments or concerns about the Syllabus, these can be passed on via ActEd. Alternatively, you can address them directly to the Institute and Faculty of Actuaries' Examination Team by email to [education.services@actuaries.org.uk](mailto:education.services@actuaries.org.uk).

## 2.1 Subject CP2 – background

### History

The Core Practices subjects (Subjects CP1, CP2 and CP3) are new subjects in the Institute and Faculty of Actuaries 2019 Curriculum.

Subject CP2 is *Modelling Practice*.

### Predecessors

The topics covered in the Core Practices subjects (Subjects CP1, CP2 and CP3) cover content previously in Subjects CA1, CA2 and CA3:

- Subject CP1 replaces Subject CA1.
- Subject CP2 replaces Subject CA2.
- Subject CP3 replaces Subject CA3.

### Exemptions

You will need to have passed or been granted an exemption from Subject CA2 to be eligible for a pass in Subject CP2 during the transfer process.

### Links to other subjects

- Subjects CM1 and CM2 – Subject CP2 builds on the concepts introduced in these subjects.
- Subjects CS1 and CS2 – Material from these subjects can also be used in Subject CP2.
- Subjects CP1 and CP3 – The principles introduced in Subject CP1 and some features of communication development in Subject CP3 are also used.

## 2.2 Subject CP2 – Syllabus

### Syllabus

The Syllabus for Subject CP2 is given here. To the right of each objective are the chapter numbers in which the objective is covered in the ActEd course.

#### **Aim**

The aim of the Modelling Practice subject is to ensure that the successful candidate can model data, document the work (including maintaining an audit trail for a fellow student and senior actuary), analyse the methods used and outputs generated and communicate to a senior actuary the approach, results and conclusions.

#### **Competences**

On the successful completion of this subject, the candidate will be able to:

1. prepare and summarise data, and undertake exploratory data analysis and visualisation
2. construct an actuarial model to solve a realistic problem
3. document the model by constructing an audit trail
4. analyse the methods used and outputs generated
5. communicate the results.

#### **Links to other subjects**

This subject builds upon concepts introduced in CM1 (Actuarial Mathematics) and CM2 (Financial Engineering and Loss Reserving). It can also use material from CS1 (Actuarial Statistics) and CS2 (Risk Modelling and Survival Analysis).

This subject also uses the principles in CP1 (Actuarial Practice) and some features of the communications development in CP3 (Communications Practice).

#### **Syllabus topics**

1. Preparation and exploratory analysis of data (2%) (0% – 10%)
2. Development of a model (18%) (15% – 20%) with clear documentation (30%) (25% – 35%)
3. Analysis of methods and model outputs (10%) (10% – 20%)
4. Application and interpretation of results (20%) (15% – 25%)
5. Communication of results and conclusions (20%) (20% – 35%)

The mean weightings are indicative of the approximate balance of the assessment of this subject between the main syllabus topics, averaged over a number of examination sessions, and taking account of how the subject is to be examined in future.

In addition to the mean weightings, a range for the weightings has been provided to indicate how the typical weightings of main syllabus topics may vary in a given examination session. This reflects the variation resulting in the underlying models used and the questions asked in a given examination session.

The weightings also have a correspondence with the amount of learning material underlying each syllabus topic. However, this will also reflect aspects such as:

- the relative complexity of each topic, and hence the amount of explanation and support required for it
- the need to provide thorough foundation understanding on which to build the other objectives
- the extent of prior knowledge which is expected
- the degree to which each topic area is more knowledge or application based.

### ***Skill levels***

The use of a specific command verb within a syllabus objective does not indicate that this is the only form of question which can be asked on the topic covered by that objective. The Examiners may ask a question on any syllabus topic using any of the agreed command verbs, as are defined in the document 'Command verbs used in the Associate and Fellowship written examinations'.

Questions may be set at any skill level: Knowledge (demonstration of a detailed knowledge and understanding of the topic), Application (demonstration of an ability to apply the principles underlying the topic within a given context) and Higher Order (demonstration of an ability to perform deeper analysis and assessment of situations, including forming judgements, taking into account different points of view, comparing and contrasting situations, suggesting possible solutions and actions, and making recommendations).

In Subject CP2, the approximate split of assessment across the three skill types is:

- 20% Knowledge
- 50% Application
- 30% Higher Order skills.

**Detailed syllabus objectives**

1. Preparation and analysis of data (10%)
  - 1.1 Use appropriate tools for cleaning, restructuring and transforming data to make it suitable for analysis.
  - 1.2 Summarise data using appropriate analysis, descriptive statistics and graphical representation.
  - 1.3 Select and carry out appropriate statistical tests of reasonableness.
  - 1.4 Make appropriate assumptions about the data provided.
  - 1.5 Repair corrupt or missing data.
2. Development of a model with clear documentation (30%)
  - 2.1 Plan and produce a spreadsheet model to solve a specified problem.
  - 2.2 Document the results of the model including justification of key assumptions, detailing the methodology adopted, an appropriate level of reasonableness checks, sensitivities and limitations.
  - 2.3 Produce and audit trail enabling detailed checking and high-level scrutiny of the model by a fellow student and a senior actuary.
3. Analysis of methods used and model outputs (15%)
  - 3.1 Perform checks on the results of a model, including applying sensitivity and/or scenario tests.
  - 3.2 Comment on the reasonableness of the results under different scenarios.
4. Application and interpretation of results (20%)
  - 4.1 Apply the results to the problem set, suggesting solutions.
  - 4.2 Summarise the results using appropriate charts and tables.
  - 4.3 Consider possible next steps.
5. Communication of results and conclusions (25%)
  - 5.1 Plan and draft a summary document to cover the data, approach, assumptions, results, conclusions and suggested next steps for presentation to a senior actuary.
  - 5.2 Create appropriate data visualisations to communicate the key conclusions of an analysis.

**Assessment**

Two three-hour and fifteen-minute computer-based modelling assignments.



## 2.3 Subject CP2 – the course structure

The Course Notes for Subject CP2 have been written to teach you the general principles and technical knowledge you need for CP2, and to give guidance on passing the exam. The chapters are arranged as follows:

- Chapter 1 provides an introduction to CP2.
- Chapter 2 to 6 cover the theory relating to the main syllabus areas.
- Chapters 7 to 8 describe the use of Excel and Word in CP2.
- Chapter 9 covers exam technique.
- Chapters 10 and 11 contain worked example projects for Papers 1 and 2.

The following table shows how the Subject CP2 chapters relate to the syllabus. We have also given you a broad indication of the length of each chapter. This table should help you plan your progress across the study session.

<b>Chapter</b>	<b>Title</b>	<b>No of pages</b>	<b>Syllabus objectives</b>
1	Introduction to Subject CP2	10	
2	Analysing data	12	1.1 – 1.5
3	Developing a model	11	2.1
4	Creating an audit trail	15	2.2, 2.3
5	Creating a project summary	21	3.1 – 3.2, 4.1 – 4.3, 5.1
6	Presenting results	16	5.2
7	Using Excel	49	
8	Using Word	15	
9	Exam technique	6	
10	Worked example Paper 1	21	
11	Worked example Paper 2	16	

You should work through the notes fully before attempting any exam-style questions and assignments. As the notes are relatively short, you should be able to read them several times before the exam. However, the main way to develop the skills you need for the CP2 exam is to practise.

## 2.4 Subject CP2 – summary of ActEd products

In addition to the CP2 Course Notes, ActEd offer a set of Assignments and Mock Exam papers, which give you an opportunity to practise the skills needed for the CP2 exams.

### Series X Assignments

There are three Assignments:

- Assignment X1 (1¾ hours) focuses on the Excel aspects of CP2
- Assignment X2 (1¾ hours) focuses on the audit trail, summary report and charts
- Assignment X3 (3¾ hours) is similar to a CP2 Paper 2 exam.

Assignments X1 and X2 require you to submit written answers (similar to the assignments in the other subjects).

Assignment X3 requires you to produce a spreadsheet model (using MS Excel) and an audit trail (using MS Excel or MS Word).

To attempt Assignment X3, you will need to download a data file from the ActEd website.

### Mock Exam

The Mock Exam consists of two papers:

- Paper 1 (3¾ hours) is similar to a CP2 Paper 1 exam
- Paper 2 (3¾ hours) is similar to a CP2 Paper 2 exam.

To attempt each of the Mock Exam papers, you will need to download a data file from the ActEd website.

ActEd's Mock Exams are intended to be attempted under exam conditions and then sent to ActEd for marking. You can use these to help you identify any areas you need to focus on in your preparation for the exam itself. The two papers must be purchased together, but you do not need to submit both at the same time.



#### ***Have you done these before?***

Please note that Assignment X3 and the two Mock Exam papers are updated versions of the Mock Exams we offered previously for Subject CA2. So these may not be suitable for you if you have attempted these previously.

### Additional Mock Pack (AMP)

This consists of four further mock exam papers – Mock Exam 2 (Papers 1 and 2) and Mock Exam 3 (Papers 1 and 2).

**Tutorials (face-to-face and live online)**

We also offer a Preparation Day tutorial for Subject CP2 with a choice of attending face-to-face or attending a live online webinar.

Our CP2 Preparation Day tutorials are designed to build upon your learning from the CP2 Course Notes and help develop the key communication skills you need to pass the exam. The tutorial includes short exercises providing opportunities to practise these skills. You will leave the tutorial with your own personal action plan so that you know how you need to improve before the exam.

Face-to-face tutorials are offered at various locations. Full details of face-to-face and live online tutorials, including how to apply, are set out in our Tuition Bulletin, which is available from our website at **[www.ActEd.co.uk](http://www.ActEd.co.uk)**.

**Online classroom**

We also provide a CP2 Online Classroom, which covers similar material to the Preparation Day tutorial. For further details, see our Tuition Bulletin, which is available from our website at **[www.ActEd.co.uk](http://www.ActEd.co.uk)**.

## 2.5 Subject CP2 – skills and assessment

### Exam skills

#### *Exam question skill levels*

The use of a specific command verb within a syllabus objective does not indicate that this is the only form of question which can be asked on the topic covered by that objective. The Examiners may ask a question on any syllabus topic using any of the agreed command verbs, as are defined in the document 'Command verbs used in the Associate and Fellowship written examinations'.

Questions may be set at any skill level:

- **Knowledge** (demonstration of a detailed knowledge and understanding of the topic)
- **Application** (demonstration of an ability to apply the principles underlying the topic within a given context)
- **Higher Order** (demonstration of an ability to perform deeper analysis and assessment of situations, including forming judgements, taking into account different points of view, comparing and contrasting situations, suggesting possible solutions and actions, and making recommendations).

In the CP2 subject, the approximate split of assessment across the three skill types is:

- 20% Knowledge
- 50% Application
- 30% Higher Order skills.

### Assessment

Assessment consists of:

- Paper 1 – a 3¼-hour computer-based online examination requiring a model and audit trail to be completed.
- Paper 2 – a 3¼-hour computer-based online examination requiring a spreadsheet to be updated and a summary report completed.

These two examinations must be sat (and passed) together.

Each paper will be marked out of 100 and the scores for the two papers will be aggregated. There will be no requirement to pass or to reach a minimum standard on either paper on a stand-alone basis.

## 2.6 Subject CP2 – frequently asked questions

**Q:** *What differences are there between CP2 and CA2?*

**A:** The CP2 exam is expected to be very similar to the CA2 exam, which it has now replaced. The only significant area of change is that the examiners have indicated that there will be more emphasis in the CP2 exam on data issues than there were in CA2.

**Q:** *I have a different version of Excel and Word on my computer. Will this be a problem?*

**A:** The version of Microsoft Office used in the exam is under constant review, so you should check on the IFoA website which version is specified for your exam. Using a later version than the one specified should not be a problem, but if you are using an older version, there is a risk that your version may not be able to handle some of the features used in the files provided.

**Q:** *What happens if my computer crashes?*

**A:** To minimise the damage if your computer crashes, you should save your files at regular intervals during the exam, so that you don't lose the work you've done.

**Q:** *What happens if I can't upload my files for marking at the end of the exam, eg if the internet goes down?*

**A:** The examiners have said that, provided the time stamp on your files falls within the permitted time window, you don't need to worry if you cannot upload your files straight away. If you have problems, just make sure that you submit them as soon as possible after the end of the exam.

**Q:** *Am I allowed to use my CP2 ActEd notes in the exam?*

**A:** Yes, you can refer to any printed reference material you want to use, including the ActEd Notes, the feedback from your Mock Exams and the checklists from the ActEd CP2 Preparation Day. You can also use any notes you have made yourself.

**Q:** *Am I allowed to set up templates for my spreadsheet, audit trail and summary and start from these in the exam?*

**A:** No. You must create all your electronic files from scratch during the exam (or, in Paper 2, start from the spreadsheet provided). However, there's nothing to stop you preparing a handwritten or printed 'crib sheet' to work from. This could include the worksheet names and colour conventions for your spreadsheet, the section headings for the audit trail and summary, as well as any preferred wording you like to use and lists of the 'usual suspects' for points that often feature in the data, assumptions and next steps sections.

**Q:** *Will I need a copy of the 'orange' tables as well?*

**A:** It's a good idea to have your *Tables* to hand during the exam in case you want to check a formula or one of the tabulated values.

**Q:** *The specimen projects I have seen have mainly involved data analysis, manipulation and calculations. Are there any other different types of projects that could come up?*

**A:** The projects can take any form. Other possibilities might, for example, include:

- carrying out a simulation
- comparing the results obtained using different models.

**Q:** *Doesn't spending time at the start of the Paper 1 exam writing a plan for the project just use up valuable time?*

**A:** As with any project, planning what is required at the outset allows the work itself to be carried out more efficiently later on. Experience has shown that students who launch straight into their spreadsheet often end up backtracking later on and then find that they have to rush to complete their audit trail.

**Q:** *A lot of the specimen projects seem to involve calculations for several different scenarios. What is the best way to deal with this in the exam?*

**A:** There are two approaches you can use here, depending on the volume and complexity of the calculations involved.

If the different scenarios are just a small part of the model and involve straightforward calculations, you can just calculate the scenarios in parallel columns on the same worksheet, so that they appear as a table. But if the calculations are more wide-ranging or more complicated, you should carry out the calculations for each scenario on a separate worksheet ('tab'). In this case, the parallel worksheets should be the same, apart from the aspects that differ between the scenarios.

**Q:** *Why do some of the projects on the IFoA website mention extra data for an additional task or scenario given halfway through the assessment?*

**A:** Previously (before July 2014), the CA2 exams were supervised by an assessor and part of the exam involved testing whether students could deal with an unexpected additional task (which frequently happens in real life). With the current exam format, any 'extra' tasks you may need to do will be specified in the initial instructions.

**Q:** *Some of the spreadsheet solutions for the projects on the IFoA website include an Overview tab at the start. Are we expected to do this in the exam?*

**A:** In projects where you have a dozen or more tabs in your spreadsheet, it can be useful to include a 'contents' tab (giving the name of each tab and a very brief description of its contents) at the start. This helps with 'signposting' to make it easier for another user to find the particular worksheet they are interested in, particularly if some of the worksheets are quite similar or there are a large number of them.

However, in the exam you are unlikely to have more than a few tabs and the examiners have said that they don't usually award marks for a 'contents' tab and they don't require students to include one in the exam.

**Q:** *I don't use Excel much at work. What should I do in the exam if I don't know how to do something in Excel?*

**A:** If you have an Excel question that isn't covered in the ActEd Notes, you can use the Excel help feature, which you can access by pressing the F1 key.

If you can't think of a way to automate a particular calculation, you can use a 'placeholder', where you temporarily type in the answer (marking clearly that you've done this). You can then continue and come back later to try to automate it.

**Q:** *Can I use features such as pivot tables and auto-filter in my spreadsheet? I use these a lot at work.*

**A:** It's best to avoid using pivot tables in the CP2 exam because you would need to write a lot more in your audit trail to describe how to use these, compared with an approach that uses standard functions such as COUNTIF and SUMIF.

The auto-filter feature can be useful for spotting rogue entries in columns of data and for reconciling totals. If you use this, make sure you describe how you have used it in your audit trail, as it is an interactive feature that leaves no permanent record in your spreadsheet.

**Q:** *Should I do my audit trail using Excel or Word?*

**A:** The CP2 examiners have said that you can use either in the assessment. The important thing is that your audit trail is complete and in one place.

If you use an Excel worksheet for your audit trail, you might find it helpful to turn off the gridlines to make it easier to read. To do this, untick the Gridlines box on the View menu. This setting will be stored with the worksheet, but won't affect the other worksheets in your workbook.

**Q:** *Why do you recommend using a 'descriptive', rather than a 'narrative' style, for the audit trail?*

**A:** The CP2 examiners have stated that both approaches are acceptable. However, the descriptive approach has the advantage that it is 'driven by' the spreadsheet, which makes it easier for a reviewer to check specific parts of the calculations. Another advantage of the descriptive style from a student's point of view is that it encourages you to focus on the aspects of the project that will gain marks in the exam.

**Q:** *I am never sure whether to reproduce equations and Excel functions in my audit trail. Can you give any guidance on this?*

**A:** When you are describing the technical aspects of your model in the audit trail, the important thing is to describe how your model works. If another user is looking at your audit trail and has the spreadsheet open, they should be able to understand how you did the calculations without needing to go 'into' the Excel formulae. Usually the best way to do this is to give a description of the calculation method in words (as in the audit trail in the Worked Example). It is fine to include the occasional equation if this is an effective way of clarifying some of the steps, but 'avoidance of excessive reproduction of Excel formulae' is something that scores marks.

**Q:** *The marking schedule refers to 'appropriate language'. What does this mean?*

**A:** The summary in Paper 2 is written for a senior actuary to read and the audit trail is written for a fellow student and/or senior actuary. So you should use the kind of language and terminology that they would expect to see. You should also make sure that you use technical terminology correctly. For example, you should not refer to parameters as 'data values'.

**Q:** *There seem to be quite a lot of marks for the assumptions, checks, comments and next steps. How many of these do we need to include?*

**A:** These do indeed carry a lot of marks. So it is important to include enough of them.

The number of marks you will score for each point you make will depend on whether it is a key point or a more minor one (and whether you have stated it clearly). As a rough guideline, to score full marks a good candidate might typically include:

- 5 different automated checks in the spreadsheet for Paper 1 (including some checks on the calculations as well as the data)
- 3 different reasonableness or independent checks in the audit trail for Paper 1
- 7 or 8 assumptions in the audit trail for Paper 1 (which need to be genuine assumptions, not statements relating to the parameter values or the results)
- 3 or 4 additional assumptions in the summary for Paper 2
- 5 or 6 comments or reasonableness checks on the results for Paper 2 (which should 'add value', rather than just repeat the results of the calculations)
- 12 to 15 next steps in the summary for Paper 2 (which should also briefly mention the *reason* why each suggestion would be helpful).



**Q:** *When I'm doing the summary in Paper 2, can I just copy the assumptions from the audit trail provided?*

**A:** If the assumptions in the audit trail provided are appropriate for the summary (ie if they are important for the senior actuary to know), you can repeat these, rewording them where necessary. But, to score full marks, the examiners will expect you to add some more assumptions, again remembering that these are intended for the senior actuary overseeing the project.

**Q:** *The Guide to CP2 Modelling Practice mentions 'technical standards'. Do I need to address these in my audit trail or my summary?*

**A:** You won't be expected to mention these explicitly in the CP2 exam. However, you should be aware of them and you should apply them where appropriate.

For example, regarding the data, you should check any data provided and show that you understand the importance of having complete and accurate data. You could mention this as one of your assumptions and, if you have any doubts about the quality of the data, you could include this in the Next Steps section of your summary as something to follow up on.

For the modelling stage, you need to ensure that the documentation in your audit trail is 'fit for purpose'. In particular, it must contain sufficient detail and be clear, unambiguous and complete.

For the reporting stage, you need to ensure that your summary is complete and covers all material and relevant information that the senior actuary will need.

**Q:** *What have the pass rates and pass marks been for this subject?*

**A:** The pass rates and pass marks for the most recent exam sessions were:

- 2018 (CA2): April 70% (pass mark 62), September 48% (pass mark 60)
- 2019 (CP2): April 68% (pass mark 60), September 61% (pass mark 60)

As in the other actuarial exams, you can maximise your chances of passing by preparing thoroughly beforehand. This includes working through some of the sample projects, attempting the ActEd mock exams, attending an ActEd Preparation Day, and focusing on any 'weak' areas you have highlighted.

**Q:** *Most of the mark allocations indicated on the CA2 and CP2 exam papers are in blocks of 5 or more. Does this mean that the marking will be largely subjective?*

**A:** The marks shown in the exam questions are in blocks, but the marking schedule used by the examiners will be broken down further. Since the instructions for the Subject CP2 assessments are usually quite open-ended, these will allow for a range of different approaches. However, as for the other actuarial exams, the assessors will take great care to ensure that they mark the assessments consistently.

**Q:** *Would you recommend doing a Mock Exam and what is the deadline for these?*

**A:** There are two Mock Exams available from ActEd – one for Paper 1 and one for Paper 2. We encourage candidates to attempt these to help resolve issues commonly experienced by CP2 candidates in advance of the exam.

The final deadline are shown at the end of this Study Guide, but you should aim to submit your files for marking **at least four weeks** before your exam. They will be marked by an ActEd tutor or by one of ActEd's external markers. You will receive a detailed breakdown of your marks and an analysis of your work, highlighting areas you need to focus on. You will also receive a set of specimen solutions, including the relevant spreadsheet, audit trail, summary and planning sketch.

Note that if you submit your work for marking very close to your exam date, we may not be able to mark it and return it to you before your exam.

**Q:** *Is there someone I can email if I have a query?*

**A:** If you have a query about these notes, you can send an email to us at ActEd in the usual way. The email address for this subject is **CP2@bpp.com**.

If you have a more general query about the exam or the objectives or the 'rules', you should address this to **examination.services@actuaries.org.uk**.