

# 2021 Study Guide

## Subject F102

### *Introduction*



This Study Guide has been created to help you navigate your way through Subject F102. It contains all the information that you will need before starting to study Subject F102 for the 2021 exams. **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 The Subject F102 course structure

There are six parts to the Subject F102 course. The parts cover related topics although some parts are longer than others. The parts are broken down into chapters. The following table shows how the parts, the chapters and the syllabus items relate to each other. This table should help you plan your progress across the study session.

Part	Chapter	Title	Pages	Syllabus
1	1	Life insurance products 1	32	(b)
	2	Life insurance products 2	20	(b)
	3	Life insurance products 3	17	(b)
	4	Life insurance products 4	42	(b)
	5	Income protection	57	(b)
	6	Critical illness	44	(b)
	7	Long-term care insurance	53	(b)
	8	Asset shares	22	(d)
	9	With-profits surplus distribution 1	32	(c)
	10	With-profits surplus distribution 2	24	(c), (h)
2	11	The general business environment 1	25	(e)
	12	The general business environment 2	29	(e)
	13	Risk 1	21	(f)
	14	Risk 2	24	(f)
	15	Risk 3	13	(f)
3	16	Unit pricing	17	(j)
	17	Actuarial funding	16	(j)
	18	Models 1	25	(i)
	19	Models 2	36	(h), (i)
	20	Product design	26	(m)
4	21	Setting assumptions 1	59	(n)
	22	Setting assumptions 2	23	(n)
	23	Supervisory reserves and capital requirements 1	22	(o)
	24	Supervisory reserves and capital requirements 2	25	(o)
	25	Surrender values	27	(l)
	26	Alterations	28	(l)
5	27	Cost of guarantees and options	24	(k)
	28	Pricing health and care contracts	45	(i)
	29	Reinsurance 1	24	(g)
	30	Reinsurance 2	33	(g)
	31	Underwriting	38	(g)
	32	Policy data checks	11	(h)
6	33	Investment	37	(h), (i), (p)
	34	Further risk management	23	(h)
	35	Monitoring experience	48	(q)
	36	The big picture	40	–
		Glossary	18	(a)

## 2 ***The Course and the Profession***

The Course consists of Course Notes, the Question and Answer Bank and the Series X Assignments. Collectively, these are referred to as the Combined Materials Pack (CMP).

### ***Course Notes***

The Syllabus for Subject F102 has been written by the Actuarial Society of South Africa (ASSA) and states the requirements of the examiners. In doing this, the ASSA has based the Subject F102 Syllabus very closely upon the Syllabus of the UK Profession's Subject SP2 (previously called Subject ST2). 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 6 of this Study Guide. We recommend that you use the Syllabus as an important part of your study.

The Subject F102 Course Notes include the majority of the UK Profession's Core Reading from Subject SP2 and some parts of the Core Reading from Subject SP1 (previously called Subject ST1). This Core Reading has been supplemented by additional material written by ASSA so that this course is relevant for Subject F102. The tuition material that has been written by ActEd enhances this by giving examples and further explanation of key points.

The UK Core Reading appears in **bold Arial font** and covers what is needed to pass the UK exams. The remaining text has been written either by:

- ActEd, to enhance it by giving examples and further explanation of key points
- the ASSA to cover ideas specific to Subject F102.

Note that both the UK Core Reading and the additional text form part of the tuition material and are examinable for the Subject F102 exam.

### ***Question and Answer Bank***

The Question and Answer Bank provides a comprehensive bank of questions (including some past exam questions) with full solutions and comments.

The Question and Answer Bank is divided into seven parts. The first six parts include a range of short and long questions to test your understanding of the corresponding part of the Course Notes. Part seven consists of 100 marks of exam-style questions.

## **Assignments**

The six Series X Assignments (X1 to X6) cover the material in Parts 1 to 6 respectively. Assignments X1, X2 and X3 are 80-mark tests and should take you two and a half hours to complete. Assignments X4, X5 and X6 are 100-mark tests and should take you three hours to complete. The actual Subject F102 examination will have a total of 100 marks.

The F102 Combined Materials Pack includes assignment questions and solutions. It may be tempting to take a peek at the solutions first, but you will learn much more by attempting the assignments under exam conditions before checking your answers.

We are not able to offer marking for the Subject F102 assignments. However, marking is available for the similar Subject SP2 assignments.

## **Core Reading accreditation**

The Institute and Faculty of Actuaries and ASSA would like to thank the numerous people who have helped in the development of this material and in the previous versions of Core Reading.

## **The Profession's Copyright**

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

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

### ***Past exam papers***

You can download the past papers and reports for Subject F102 from the Actuarial Society's website at **[www.actuarialsociety.org.za](http://www.actuarialsociety.org.za)**.

Past papers and reports for UK Subject SP2/ST2, which covers similar material to Subject F102, are available at **[www.actuaries.org.uk](http://www.actuaries.org.uk)**.

### ***Recommended reading***

The exam will be based on the relevant Syllabus and Core Reading and the course material will be the main source of tuition for students.

### ***Calculators***

Please refer to the profession's website for the latest advice on which calculators are permitted in the exams.

### 3 **Further study support**

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 revise 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.

ActEd offers 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 ActEd produces. Not all products are available for all subjects.

LEARNING	LEARNING & REVISION	REVISION	REVISION & REHEARSAL	REHEARSAL
Course Notes	Q&A Bank X Assignments	Flashcards	Revision Notes ASET	Mock Exam Additional Mock Pack (AMP) Mock marking

Products are generally available in both paper and eBook format. Visit [www.ActEd.co.uk](http://www.ActEd.co.uk) for full details about available eBooks, software requirements and restrictions.

ActEd don't explicitly offer revision or rehearsal products for Subject F102, but the equivalent products for the UK Subject SP2 would give good coverage of the Subject F102 Syllabus. The additional products and services available for Subject SP2 are described below.

## **“Revision” product**

For most subjects, there is *a lot of material* to revise. Finding a way to fit revision into your routine as painlessly as possible has got to be a good strategy.

### **Flashcards**

Flashcards are an inexpensive option that can provide a massive boost. They can also provide a variation in activities during a study day, and so help you to maintain concentration and effectiveness.

Flashcards are a set of A6-sized cards that cover the key points of the subject that most students want to commit to memory. Each flashcard has questions on one side and the answers on the reverse. We recommend that you use the cards actively and test yourself as you go.

The following questions and comments might help you to decide if flashcards are suitable for you:

- Do you have a regular train or bus journey?  
*Flashcards are ideal for regular bursts of revision on the move.*
- Do you want to fit more study into your routine?  
*Flashcards are a good option for “dead time”, eg using flashcards on your phone or sticking them on the wall in your study.*
- Do you find yourself cramming for exams (even if that’s not your original plan!)?  
*Flashcards are an extremely efficient way to do your pre-exam memorising.*

## **“Revision & rehearsal” products**

### **Revision Notes**

ActEd’s Revision Notes have been designed with input from students to help you revise efficiently. They are suitable for first-time sitters who have worked through the ActEd Course Notes or for retakers (who should find them much more useful and challenging than simply reading through the course again).

The Revision Notes are a set of five A5 booklets – perfect for revising on the train or tube to work. Each booklet covers one main theme of the course and includes:

- Core Reading with a set of integrated short questions to develop your bookwork knowledge
- relevant past exam questions with concise solutions from ten previous years, and
- other useful revision aids.

### ***ActEd Solutions with Exam Technique (ASET)***

The ActEd Solutions with Exam Technique (ASET) contains ActEd’s solutions to a number of previous Subject ST2/SP2 exam papers, plus comment and explanation. In particular, it highlights how questions might have been analysed and interpreted so as to produce a good solution with a wide range of relevant points. This will be valuable in approaching questions in subsequent examinations.

## ***“Rehearsal” products***

### ***Mock Exam***

Mock Exam is a 100-mark mock exam paper and is available for students as a realistic test of their exam preparation.

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

The Additional Mock Pack (AMP) consists of two further 100-mark mock exam papers – Mock Exam 2 and Mock Exam 3. This is ideal if you are retaking 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. There are two different ways in which you can purchase marking for the mock exam:

- Mock Exam Marking applies to a specified subject, session and student
- Marking Vouchers can be used for the Mock Exam.

Please note that:

- marking is not included with the products themselves 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.

### ***Queries and feedback***

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 ActEd's 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)**). You might find the Subject SP2 forum useful, along with the forum for students studying in South Africa.

Our online forum is dedicated to actuarial students so that you can get help from fellow students on any aspect of your studies from technical issues to study advice. You could also use it to get ideas for revision or for further reading around the subject that you are studying. 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 have any comments or concerns about the Syllabus or Core Reading, these can be passed on via ActEd by emailing [SP2@bpp.com](mailto:SP2@bpp.com). Alternatively, you can send these comments to:

Christelle Mouton-Hicklin  
Education Specialist

Email: [courses@actuarialsociety.org.za](mailto:courses@actuarialsociety.org.za)

Office: + 27 (0) 11 672 3114

### ***The ActEd website***

The ActEd website at **www.ActEd.co.uk** contains much useful information on all aspects of ActEd's products and services, including:

- copies of the Study Guide in every subject
- the current *Student Brochure* and application forms
- a link to ActEd's online store
- a link to the ActEd discussion forum
- details of any minor corrections to the study material

## **4 How to study to pass the exams**

### ***The F100 Subject exams***

It is important to recognise that the F100 subject exams are very different from the earlier exams in both the nature of the material covered and the skills being examined.

Both the course materials and the exam papers themselves are generally less numerical and more “wordy”. The exam will primarily require you to explain a particular point in words and sentences, rather than to manipulate formulae. If you haven’t sat this type of exam for some time, you need to start practising again now. Many students find that it takes time to adjust to the different style of the F100 subject exam questions. As ever, practice is the key to success.

The aim of the exams is to test your ability to apply your knowledge and understanding of the key principles described in the Course to specific situations presented to you in the form of exam questions. Therefore your aim should be to identify and understand the key principles, and then to practise applying them. You will also need a good knowledge of the Course to score well and quickly on any bookwork questions.

We recommend that you prepare for the exam by practising a large number of exam-style questions under exam conditions. This will:

- help you to develop the necessary knowledge and understanding of the key principles described in the Course
- highlight exactly which are the key principles that crop up time and time again in many different contexts and questions
- help you to practise the specific skills that you will need to pass the exam.

There are many sources of exam-style questions. You can use past exam papers, the Question and Answer Bank (which includes many past exam questions), Assignments, the Mock Exam and ASET.

### ***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 a month 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.

## **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 Questions 1.4, 1.7 and 1.12 from the Question and Answer Bank*”, 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 on page 1 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. Our suggested solutions are at the end of each chapter. 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.

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 self-assessment questions again a few days after reading the chapter itself.

You may like to attempt some questions from the Question and Answer Bank when you have completed a part of the course. 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 part of the notes and tried a selection of questions from the Question and Answer Bank, you should attempt the corresponding assignment. If you submit a Subject SP2 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 not only know and understand the Course, but also 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 questions as you can from the Question and Answer Bank and past exam papers.

### ***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 make you study each part as well as possible.
  - It is also 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 a mock exam written by ActEd or a past exam paper.

## 5 *Frequently asked questions*

**Q: *Has Subject F102 changed since last year?***

A: The Syllabus for Subject F102 is unchanged from last year. Only minor changes have been made to the F102 Course Notes to improve their readability.

**Q: *What knowledge of earlier subjects should I have?***

A: The Course Notes have been written assuming that you have already studied, or been exempted from, the foundation technical and intermediate technical subjects. It would also prove useful, although not essential, to have studied Subject A311. The key area that you will need in studying Subject F102 is the material in Subject A213 (or equivalently the UK Subject CM1, formerly Subject CT5).

**Q: *What are the equivalent subjects in the UK Syllabus?***

A: Subject F102 contains largely the same material as the UK Subject SP2 (which covers insurance products contingent on human life). Subject F102 also contains some material covered by the UK Subject SP1 (which covers insurance products contingent on human health). However, Subject F101 contains the majority of material covered by the UK Subject SP1.

Note that Subjects SP1 and SP2 were previously called Subjects ST1 and ST2 respectively.

**Q: *Do you have any revision products for F102?***

A: Not explicitly, but the revision products for the UK Subject SP2, listed in Section 3, would give good coverage of the Subject F102 Syllabus for insurance products contingent on human life. Revision products for Subject SP2 include Revision Notes, Flashcards, ASET and Mock Exams.

**Q: *What calculators am I allowed to use in the exam?***

A: Please refer to the Profession's website for the latest advice.

## 6 **Syllabus**

The full Syllabus for Subject F102 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 Life Insurance Principles subject is to instil in successful candidates principles of actuarial planning and control, and mathematical and economic techniques, relevant to life insurance companies. The student should gain the ability to apply the knowledge and understanding, in simple situations, to the operation, on sound financial lines, of life insurance companies.

### **Links to other subjects**

Subject A213 (previously Subject CT5, now part of Subject CM1) – Contingencies: introduces techniques that will be drawn upon and developed by this subject.

Subject A311 (previously Subject CA1, now Subject CP1) – Actuarial Risk Management: covers the general underlying principles affecting all specialisms.

Subject F202 – Life Insurance Applications: will use the principles and techniques in this, and the earlier subjects, to solve life insurance problems within a specifically South African context.

### **Objectives**

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

- (a) Define the principal terms used in life insurance. (Glossary)
- (b) Describe the main types of life insurance, long-term care insurance, critical illness and income protection products in terms of:
  - the needs of consumers versus the objectives of the insurer
  - the benefits, guarantees, and options that may be provided
  - the main types of products issued
  - the purpose of the products for the insurer
  - the purpose of the products for the insured
  - the benefits, and the financial and other risks (including capital requirements), associated with these products to the insurer
  - the benefits and risks of the products to the insured.

The products under this syllabus objective may provide benefits of the following types:

- single, or periodic, payments from the date of death, disability or critical illness
- single, or periodic, payments on survival to a specified point in time
- periodic payments on continued survival

and the products may be written on the following bases:

- single or regular premium
- without-profits non-linked
- unit-linked
- index-linked
- with-profits
- single, joint, or group life basis
- with or without conversion options and options to change the level of benefits provided.

(Chapters 1–7)

(c) Describe the following methods of distributing profits to with-profits policyholders:

- cash bonus
- premium reduction
- benefit increase
- “additions to benefits” method
- “revalorisation” method
- “contribution” method.

(Chapters 9 & 10)

(d) Describe the technique of asset shares, explain how an asset share may be built up using a recursive formula, and explain the main uses of asset shares.

(Chapter 8)

- (e) Describe the effect of the general business environment, including the impact on level of risk to the insurer, in terms of:
- propensity of consumers to purchase products
  - methods of sale
  - remuneration of sales channels
  - types of expenses and commissions including influence of inflation
  - economic environment (including developing / volatile economies and risky markets)
  - legal environment
  - regulatory constraints and opportunities
  - fiscal constraints and opportunities
  - professional guidance constraints and opportunities. (Chapters 11 & 12)
- (f) Discuss how the following can be a source of risk to a life insurance company:
- policy and other data
  - mortality and morbidity rates
  - investment performance
  - expenses, including the effect of inflation
  - withdrawals
  - mix of new business by nature and size of contract, and by source
  - volume of new business
  - guarantees and options
  - competition
  - actions of the board of directors or staff
  - actions of distributors
  - failure of appropriate management systems and controls
  - counterparties
  - legal, regulatory, and fiscal developments
  - fraud
  - aggregation and concentration of risk including credit failure.
- (Chapters 13–15)
- (g) Describe the roles of reinsurance and underwriting, including the managing of risk.
- (Chapters 29–31)

- (h) Discuss further ways of managing the risks in (f) above:
- policy data checks
  - choice of with-profits bonus method
  - capital management
  - asset-liability matching
  - expense control
  - policy retention activity
  - management of new business mix and volumes
  - management of options
  - systematic risk assessment and management strategies
- (Chapters 10, 19, 32–34)
- (i) Describe the use of actuarial models, including multi-state models, stochastic models and Monte Carlo simulation, for decision making purposes in life insurance in terms of:
- the objectives of, and requirements for, building a model for the management of life insurance products
  - the basic features of a model required to project life insurance business
  - choosing between stochastic and deterministic approaches
  - the differences between traditional and financial economic approaches
  - the use of sensitivity analysis or the assessment of variances
  - the use of models for:
    - pricing
    - assessing the return on capital
    - assessing the profitability of existing business
    - developing an appropriate investment strategy
    - projecting future supervisory solvency position.
- (Chapters 18, 19, 28 & 33)
- (j) Describe for unit-linked life insurance contracts:
- the principles of unit pricing for internal unit-linked funds
  - the technique of actuarial funding.
- (Chapters 16 & 17)

- (k) Demonstrate methods of determining the cost of guarantees and options.
- Describe the use of stochastic simulation and the use of option prices to determine the cost of an investment guarantee.
  - Describe the assessment of the cost of simple mortality options.  
(Chapter 27)
- (l) Describe methods of determination of discontinuance and alteration terms for without-profits contracts, and calculate surrender values and alteration terms for conventional without-profits contracts using reserves or by equating policy values.  
(Chapters 25 & 26)
- (m) Describe the factors to consider in determining a suitable design, in terms of benefits and charges, for a life insurance product.  
(Chapter 20)
- (n) Describe the principles of setting assumptions for pricing and valuing life insurance contracts, having regard to profit requirements and the management of risk and the return on capital, including how assumptions can be a source of risk.  
(Chapters 21 & 22)
- (o) Describe how supervisory reserves and solvency capital requirements may be determined for a life insurance company, including:
- the reasons why the assumptions used may be different from those used in pricing
  - market-consistent valuation
  - the calculation of non-unit reserves
  - the interplay between the strength of the supervisory reserves and the level of solvency capital required
  - Value-at-Risk (VaR) capital assessment
  - comparison of passive and active valuation approaches.  
(Chapters 23 & 24)
- (p) Describe the principles of investment and how they apply to a life insurance company.  
(Chapter 33)

- (q) Describe how the actual experience of a life insurance company should be monitored and assessed in terms of:
- the reasons for monitoring experience
  - the data required
  - the analysis of mortality, disability, withdrawal, expense and investment experience
  - the analysis of surplus and embedded value profit
  - the use of the results to revise the models used and assumptions.

(Chapter 35)