FINANCIAL MODELING WITH EXCEL

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Financial Modeling with Excel	2	0	0	2	Class XII	NIL

Learning Objectives: The objective of this course is to:

- Build financial models using Excel functions to solve some real-life financial problems.
- Acquire practical skills and knowledge that are useful for investment banking.

Learning Outcomes: After completion of the course the learner will be able to:

- Compute present value and future value of a cashflow or annuity.
- Create loans and amortization tables, and find price, yield, and duration of a bond.
- Draw option payoff diagrams and option strategy diagrams.
- Find option price using Black-Scholes, and binomial models.

UNIT-I: Time Value of Money (28 hours)

Building good financial models, Interest rates, Future value, Present value, Annuity, Perpetuity, Present value of an annuity, Present value of a perpetuity, Present value of non-annuity cash flows; Net present value (NPV), Internal rate of return (IRR), NPV vs IRR; Loans and amortization tables, Interest-only loan, An equal amortization term loan, Mortgage; Effective interest rates, Cost of a mortgage, Continuous compounding and discounting.

UNIT-II: Bond Pricing and Duration (12 hours)

Characteristics of bonds, Zero-coupon bond, Bond valuation, Yield to maturity, Yield curve and forward rates; Macaulay duration, Modified duration, and convexity.

UNIT-III: Options, Black-Scholes, and Binomial Models (20 hours)

Call and put options, Option strategies, Put-call parity, Black-Scholes formulae for prices of call and put options; Binomial option pricing model, and two-period binomial model.

Essential Readings

1. Benninga, Simon & Mofkadi, Tal (2018). Principles of Finance with Excel (3rd ed.). Oxford University Press, New York.
2. Sengupta, Chandan (2004). Financial Modeling using Excel and VBA. John Wiley.

Suggested Readings

- Day, Alastair L. (2015). Mastering Financial Mathematics in Microsoft Excel (3rd ed.). Pearson Education Ltd.
- Luenberger, David G. (2014). Investment Science (2nd ed.). Oxford University Press.

Practical Exercises: Review of Excel spreadsheets concepts including functions and graphs from [1]: Part Five Excel Skills. Practical work to be performed using Excel spreadsheets for the modeling of the following type of problems:

1. Calculating future value, present value, and present value of an annuity. Use of Excel functions **FV**, **PV, NPV, and PMT**. [1]: Chapter 2, Exercises 1,3,5, and 7 pages 46-47.
2. Calculating net-present value (NPV) and internal rate of return (IRR). NPV vs IRR. Use of Excel functions **NPV** and **IRR.** [1]: Chapter 3, Exercises 1 to 3 pages 99-100.
3. Creating loan and amortization table. Use of Excel functions **IPMT** and **PPMT**. [1]: Chapter 4, Exercises 1 to 3 pages 132-133.
4. Computing effective annual interest rate (EAIR), using function **IRR**, and **XIRR** (for dates, not evenly spaced). [1]: Chapter 5, Exercises 1, 4, 7, and 9 pages 169-171.
5. Calculating bond price and yield to maturity (YTM) of a bond. Use of Excel functions **PRICE**, **YIELD**, **IRR**, and **XIRR** (for non-periodic cash flows). [2]: Models 2, and 3 pages 276-279.
6. Computing duration, modified duration, and convexity of a bond. Use of Excel functions **DURATION,** and **MDURATION.** [2]: Models 4, and 5 pages 280-284.
7. Computing payoffs of call and put options, and draw profit diagrams in Excel. [1]: Chapter 17, Exercises 1 to 4 pages 572-574.
8. Studying and comparing option strategies: Bear spread, Bull spread, and Butterfly spread, and draw corresponding profit diagrams in Excel. [1]: Chapter 17, Exercises 18, 19, and 21 pages 581-583.
9. Using Black-Scholes formulae to find prices of call and put options. [1]: Chapter 19, Exercises 1 to 4 page 626.
10. Using binomial model to find prices of call and put options, and Excel tree diagram. [1]: Chapter 20, Exercises 3 to 5 page 653.

Teaching Plan (SEC Paper: Financial Modeling with Excel)

Week 1: Excel Skills, Building good financial models.
[1]: Review of Excel basics and functions from Chapters 21 to 23, and Chapter 1(Section 1.4).
Week 2: Interest rates, Future value. [1]: Chapter 2 (Section 2.1).
Weeks 3, and 4: Present value, Annuity, Perpetuity, Present value of an annuity, Present value of a perpetuity, Present value of non-annuity cash flows. [1]: Chapter 2 (Section 2.2).
Week 5: Net present value (NPV), Internal rate of return (IRR), NPV vs IRR.[1]: Chapter 3 (3.1 to 3.3).
Week 6: Loans and amortization tables, Interest-only loan, An equal amortization term loan, Mortgage. [1]: Chapter 4 (Sections 4.2 to 4.5).
Week 7: Effective interest rates, Cost of a mortgage, Continuous compounding and discounting.
[1]: Chapter 5 (Sections 5.1, 5.2, and 5.7).
Weeks 8 to 10: Characteristics of bonds, Zero-coupon bond, Bond valuation, Yield, Yield curve and forward rates; Macaulay duration, Modified duration, and convexity. **[2]**: Chapter 10.
Weeks 11 to 13: Call and put options, Option strategies, Put-call parity.
[1]: Chapter 17, and Chapter 18 (Section 18.3, and Exercises 4 to 6, page 602).
Week 14: Black-Scholes formulae for prices of call and put options. [1]: Chapter 19 (Section 19.1).
Week 15: Binomial option pricing model, Two-period binomial model. [1]: Chapter 20 (20.1 to 20.3).