

COURSE: INVESTMENTS | CHAPTER 15

OPTIONS MARKETS

Chapter Purpose

What Chapter 15 covers

This chapter explains the mechanics, pricing logic, strategies and risks of option contracts:

Instruments

- Call and put options
- Option-market terminology
- Strike prices and expiration
- Option premiums

Economics

- Payoffs and profits
- Moneyness
- Break-even prices

Strategies & Risk

- Protective puts
- Covered calls
- Spreads and combinations
- Option-market risks

Learning Objectives

14 outcomes

By the end of this chapter, students should be able to:

Foundations

- Explain what an option is
- Distinguish calls from puts
- Explain buyers' and sellers' positions
- Define strike, premium and expiration
- Explain option moneyness

Calculation

- Calculate option payoffs
- Calculate profits and losses
- Calculate break-even prices

Strategy & Risk

- Construct protective puts
- Construct covered calls
- Explain option spreads
- Explain straddles and strangles
- Explain collar strategies
- Identify major option-market risks



SECTION I — OPTION FUNDAMENTALS

A contract that separates a right from an obligation: the buyer receives a right, the seller accepts an obligation.

What Is a Derivative?

A derivative is a financial instrument whose value depends on another asset or variable. The reference item is called the underlying asset.

UNDERLYING ASSET

Examples

- Shares
- Stock indexes
- Bonds
- Currencies
- Commodities
- Interest rates

What Is an Option?

An option is a contract giving its buyer the right — but not the obligation — to:

- Buy an underlying asset; or
- Sell an underlying asset

...at a predetermined price within a specified period.

The option seller has a corresponding obligation if the buyer exercises the option.

A Price Reservation

Everyday intuition

Suppose a shop allows you to reserve a laptop for ETB 100,000 for one month. You pay ETB 5,000 for the reservation.

If the price rises to ETB 130,000

- You can still buy it for ETB 100,000
- The reservation is valuable

If the price falls to ETB 80,000

- You can ignore the reservation
- You lose only the ETB 5,000 fee

The ETB 5,000 reservation fee behaves like an option premium.

Why Do Investors Use Options?

Options may be used to:

Protection

- Hedge investment risk
- Protect portfolio value
- Construct customised payoffs

Income & Exposure

- Generate income
- Gain leveraged exposure

Views

- Trade expected price increases
- Trade expected price decreases
- Trade expected volatility

Option-Market Participants

Hedgers

- Use options to reduce existing risk

Speculators

- Accept risk in pursuit of profit

Arbitrageurs

- Profit from inconsistent prices

Market Makers

- Provide bids, offers and liquidity

Exchange-Traded vs OTC Options

Exchange-Traded Options	Over-the-Counter Options
Standardised contracts	Customised contracts
Traded on organised markets	Privately negotiated
Clearing-house support	Greater counterparty exposure
Transparent quotations	Less transparent
Generally more liquid	May be less liquid

Key Option Terms

Term	Meaning
Underlying asset	Asset referenced by the option
Strike price	Predetermined transaction price
Premium	Price paid for the option
Expiration	Final date of the option
Exercise	Using the contractual right
Option holder	Buyer of the option
Option writer	Seller of the option

Contract Size

Options may cover a specified number of underlying units. For example, if one option contract covers 100 shares and the quoted premium is ETB 8 per share:

$$\text{Contract Cost} = 100 \times 8 = \text{ETB } 800$$

Important Actual contract sizes depend on the market and the contract specifications.

Buyer vs Seller

Option Buyer

- Pays the premium
- Receives a right
- Chooses whether to exercise

Option Seller

- Receives the premium
- Accepts an obligation
- Must perform if assigned

The buyer's right creates the seller's obligation.



SECTION II — CALL OPTIONS

The right to buy: a strike-price line with potential gains above it.

What Is a Call Option?

A call option gives its buyer the right — but not the obligation — to buy the underlying asset at the strike price.

A call buyer generally expects:

THE UNDERLYING PRICE TO RISE

— Call Option

Everyday intuition

You have the right to buy a share for ETB 100.

Market price rises to ETB 140

- Buying for ETB 100 is attractive
- You exercise the option

Market price falls to ETB 80

- Buying for ETB 100 is unattractive
- You allow the option to expire

Long Call Position

A long call means buying a call option

The buyer:

- Pays the premium
- Benefits from price increases
- Has limited downside — the premium paid
- Has substantial upside potential

Short Call Position

A short call means selling or writing a call option

The seller:

- Receives the premium
- Benefits if the option expires without value
- Must sell the asset if exercised
- May face large losses if the underlying price rises sharply

Long Call Payoff Formula

At expiration:

$$\text{Call Payoff} = \max(S_T - K, 0)$$

Where S_T = underlying price at expiration and K = strike price.

The payoff cannot be negative because the buyer is not required to exercise.

Long Call Profit Formula

$$\text{Call Profit} = \max(S_T - K, 0) - \text{Premium}$$

Important Payoff and profit are not the same.

- Payoff excludes the premium.
- Profit includes the premium paid.

Call Example — Inputs

Suppose:

- Strike price = ETB 100
- Call premium = ETB 8
- Expiration = Three months

Calculate the call buyer's profit at different expiration prices.

Call Payoff and Profit Table

Price at Expiration	Call Payoff	Call Profit
ETB 80	0	-8
ETB 100	0	-8
ETB 108	8	0
ETB 120	20	12
ETB 140	40	32

Strike = ETB 100 · Premium = ETB 8 · Break-even = ETB 108

Call Example — Price Below Strike

If $S_T = \text{ETB } 80$, exercising the right to buy at ETB 100 would not be sensible.

$$\begin{aligned}\text{Payoff} &= 0 \\ \text{Profit} &= 0 - 8 = - \text{ETB } 8\end{aligned}$$

The buyer loses the premium.

Call Example — Price Above Strike

If $S_T = \text{ETB } 120$:

$$\text{Payoff} = 120 - 100 = \text{ETB } 20$$

$$\text{Profit} = 20 - 8 = \text{ETB } 12$$

Call Break-Even Price

$$\begin{aligned}\text{Call Break-Even} &= \text{Strike} + \text{Premium} \\ \text{Break-Even} &= 100 + 8 = \text{ETB } 108\end{aligned}$$

Above ETB 108, the long call earns a profit at expiration.

Long Call Risk and Reward

The hockey-stick profile

Maximum Loss

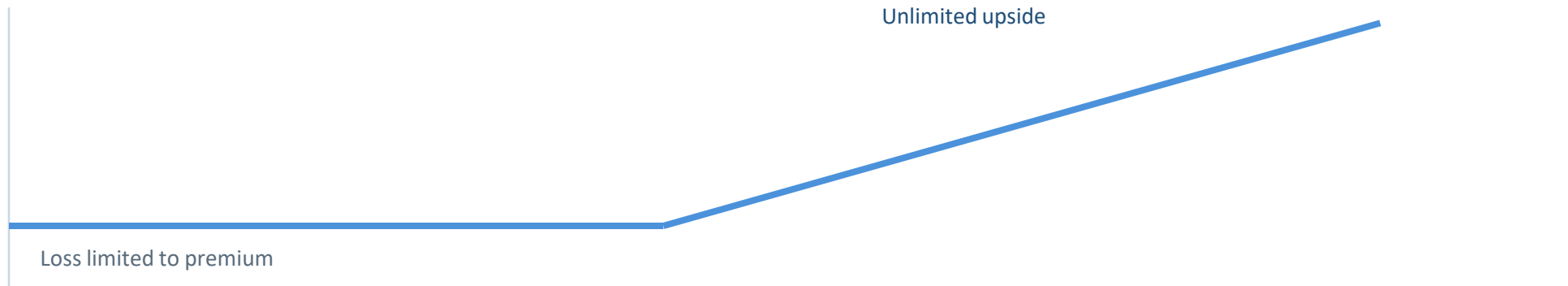
- Premium = ETB 8

Maximum Gain

- Theoretically unlimited — the underlying price can continue rising

Break-Even

- ETB 108



Short Call Profit

The call writer's profit is the opposite of the buyer's profit:

$$\text{Short Call Profit} = \text{Premium} - \max(S_T - K, 0)$$

Maximum Profit

- The premium received

Potential Loss

- Very large if the underlying price rises significantly

Naked Call Risk

A naked call writer does not own the underlying asset.

If the price rises sharply, the writer may need to buy the asset at a high market price and sell it at the lower strike price.

An uncovered call can produce losses far greater than the premium received.



SECTION III — PUT OPTIONS

The right to sell: a strike-price line with gains as the underlying price falls.

What Is a Put Option?

A put option gives its buyer the right — but not the obligation — to sell the underlying asset at the strike price.

A put buyer generally expects:

THE UNDERLYING PRICE TO FALL

— Put Option

Everyday intuition

You own a share currently worth ETB 100. You buy the right to sell it for ETB 95.

If the share price falls to ETB 60, you may still sell it for ETB 95.

INSURANCE AGAINST A MAJOR PRICE DECLINE

Long Put Position

A long put means buying a put option

The buyer:

- Pays the premium
- Benefits from price decreases
- Has limited downside — the premium paid
- Has a maximum gain, because the underlying price cannot fall below zero

Short Put Position

A short put means selling or writing a put option

The seller:

- Receives the premium
- Benefits if the price remains above the strike
- May be required to buy the asset at the strike price
- Faces losses when the underlying price falls substantially

Long Put Payoff Formula

$$\text{Put Payoff} = \max(K - S_T, 0)$$

The put has value at expiration when:

$$S_T < K$$

Long Put Profit Formula

$$\text{Put Profit} = \max(K - S_T, 0) - \text{Premium}$$

Again:

- Payoff excludes the premium.
- Profit includes the premium paid.

Put Example — Inputs

Suppose:

- Strike price = ETB 100
- Put premium = ETB 6
- Expiration = Three months

Calculate the put buyer's profit at different expiration prices.

Put Payoff and Profit Table

Price at Expiration	Put Payoff	Put Profit
ETB 70	30	24
ETB 90	10	4
ETB 94	6	0
ETB 100	0	-6
ETB 120	0	-6

Strike = ETB 100 · Premium = ETB 6 · Break-even = ETB 94

Put Example — Falling Price

If $S_T = \text{ETB } 70$:

$$\text{Payoff} = 100 - 70 = \text{ETB } 30$$

$$\text{Profit} = 30 - 6 = \text{ETB } 24$$

Put Example — Price Above Strike

If $S_T = \text{ETB } 120$, the right to sell for ETB 100 is unattractive.

$$\begin{aligned}\text{Payoff} &= 0 \\ \text{Profit} &= - \text{ETB } 6\end{aligned}$$

The buyer loses the premium.

Put Break-Even Price

$$\begin{aligned}\text{Put Break-Even} &= \text{Strike} - \text{Premium} \\ \text{Break-Even} &= 100 - 6 = \text{ETB } 94\end{aligned}$$

Below ETB 94, the long put earns a profit at expiration.

Long Put Risk and Reward

Maximum Loss

- Premium = ETB 6

Maximum Gain

- If the underlying falls to zero:
- $K - \text{Premium} = 100 - 6 = \text{ETB } 94$

Short Put Risk

The short-put writer may be required to buy a falling asset at the strike price.

Maximum Profit

- The premium received

Maximum Loss

- If the underlying falls to zero:
- $K - \text{Premium}$

Selling a put is not risk-free income.



SECTION IV — OPTION CONTRACT TERMS

Strike price, expiration and premium determine the option's economic position.

Strike Price

The strike price is the predetermined price at which the underlying asset may be bought through a call, or sold through a put.

Different strike prices create different:

- Premiums
- Payoffs
- Risks
- Probabilities of exercise

Expiration Date

Expiration is the final date on which the option remains valid. As expiration approaches:

- Less time remains for favourable price movement.
- The option's time value generally declines.
- Exercise decisions become more immediate.

After expiration, the contract no longer exists.

American vs European Options

American-Style Option

- May generally be exercised before or at expiration

European-Style Option

- May generally be exercised only at expiration

Important These labels describe exercise rules — not geographic location.

Option Premium

The premium is the price of the option. It is:

- Paid by the buyer
- Received by the writer
- Determined by market conditions
- Quoted per underlying unit in many markets

$$\text{Option Premium} = \text{Intrinsic Value} + \text{Time Value}$$

Intrinsic Value of a Call

$$\text{Call Intrinsic Value} = \max(S - K, 0)$$

If the share price is ETB 120 and the strike price is ETB 100:

$$\text{Intrinsic Value} = 120 - 100 = \text{ETB } 20$$

Intrinsic Value of a Put

$$\text{Put Intrinsic Value} = \max(K - S, 0)$$

If the strike price is ETB 100 and the share price is ETB 80:

$$\text{Intrinsic Value} = 100 - 80 = \text{ETB } 20$$

Time Value

$$\text{Time Value} = \text{Option Premium} - \text{Intrinsic Value}$$

Suppose the call premium is ETB 25 and the intrinsic value is ETB 20:

$$\text{Time Value} = 25 - 20 = \text{ETB } 5$$

Time value reflects the possibility of further favourable movement before expiration.

What Influences Option Premiums?

Major factors include:

Contract Terms

- Underlying asset price
- Strike price
- Time to expiration

Market Conditions

- Expected volatility
- Interest rates
- Expected dividends

Trading Conditions

- Market liquidity
- Supply and demand

Volatility and Option Value

Higher expected volatility generally increases both call and put values.

Why?

Higher volatility increases the possibility of a large favourable movement for the option buyer.

Important The buyer can benefit from favourable movement while declining to exercise after unfavourable movement.

Time Decay

Other things equal, option time value generally declines as expiration approaches. This is called time decay.

TIME DECAY

- Usually hurts option buyers
- Usually benefits option sellers
- Accelerates as expiration approaches



SECTION V — OPTION MONEYNES

The relationship between market price and strike price.

Three Moneyness Categories

In the Money — ITM

- Has positive intrinsic value

At the Money — ATM

- Underlying price is approximately equal to strike price

Out of the Money — OTM

- Has no intrinsic value

Call Moneyness

In the Money

- $S > K$

At the Money

- $S \approx K$

Out of the Money

- $S < K$

A call benefits from higher underlying prices.

Put Moneyiness

In the Money

- $S < K$

At the Money

- $S \approx K$

Out of the Money

- $S > K$

A put benefits from lower underlying prices.

Moneyiness Example

Assume the strike price is ETB 100.

Share Price	Call	Put
ETB 80	Out of the money	In the money
ETB 100	At the money	At the money
ETB 120	In the money	Out of the money

Moneyiness Is Not Profitability

Suppose the call strike is ETB 100, the call premium is ETB 8 and the expiration price is ETB 105. The call is in the money, but:

$$\text{Profit} = 5 - 8 = - \text{ETB } 3$$

An option can be in the money but still produce a net loss.

Four Basic Option Positions

Position	Market View	Maximum Gain	Maximum Loss
Long call	Bullish	Theoretically unlimited	Premium
Short call	Neutral / bearish	Premium	Potentially very large
Long put	Bearish / protective	Limited by price reaching zero	Premium
Short put	Neutral / bullish	Premium	Substantial

Long Stock vs Long Call

Long Stock

- Requires larger capital
- Has no expiration
- Receives dividends where declared
- Loss may be substantial

Long Call

- Requires a smaller premium
- Has expiration
- Provides leveraged exposure
- May expire worthless

SECTION VII — PROTECTIVE PUTS

Own the share and buy downside protection.

What Is a Protective Put?

A protective put combines:

1. A long position in the underlying share
2. A long put on the same share

The investor:

- Participates in price increases
- Establishes a minimum selling price
- Pays a premium for protection

— Portfolio Insurance

Everyday intuition

You own a share worth ETB 100. You buy a put allowing you to sell it for ETB 95.

If the share price collapses to ETB 50, you can still sell for ETB 95.

The put works like insurance, while the premium works like an insurance fee.

Protective Put Formula

$$\text{Profit} = (S_T - S_0) + \max(K - S_T, 0) - \text{Put Premium}$$

Where:

- S_0 = initial share price
- S_T = expiration share price
- K = put strike price

Protective Put Example

Share purchase price = ETB 100 · Put strike = ETB 95 · Put premium = ETB 4

Expiration Price	Total Profit
ETB 70	-9
ETB 95	-9
ETB 100	-4
ETB 104	0
ETB 120	16
ETB 140	36

Protective Put Limits

Break-Even

- $S_0 + \text{Premium}$
- $100 + 4 = \text{ETB } 104$

Maximum Loss

- $S_0 - K + \text{Premium}$
- $100 - 95 + 4 = \text{ETB } 9$

Maximum Gain

- Theoretically unlimited

When Is a Protective Put Useful?

It may be appropriate when an investor:

- Wants to retain the share
- Expects long-term appreciation
- Fears a short-term decline
- Wants to limit downside risk
- Is willing to pay an insurance premium

Trade-Off Protection reduces return by the premium paid.



SECTION VIII — COVERED CALLS

Own the share and sell some of its upside potential.

What Is a Covered Call?

A covered call combines:

1. A long position in a share
2. A short call on that share

The investor:

- Receives the call premium
- Keeps limited upside
- Gives up gains above the strike price
- Retains substantial downside risk

Covered Call Formula

$$\text{Profit} = (S_T - S_0) - \max(S_T - K, 0) + \text{Call Premium}$$

The owned share covers the obligation created by the written call.

Covered Call Example

Share purchase price = ETB 100 · Call strike = ETB 110 · Premium received = ETB 5

Expiration Price	Total Profit
ETB 80	-15
ETB 95	0
ETB 100	5
ETB 105	10
ETB 110	15
ETB 130	15

Covered Call Limits

Break-Even

- $S_0 - \text{Premium}$
- $100 - 5 = \text{ETB } 95$

Maximum Profit

- $K - S_0 + \text{Premium}$
- $110 - 100 + 5 = \text{ETB } 15$

Covered Call Trade-Off

Advantage

- Premium income provides a limited buffer against price declines

Disadvantage

- Profit is capped when the share price rises above the strike

Risk

- The investor still owns the share and may experience a major loss if its price collapses



SECTION IX — SPREADS AND COMBINATIONS

Combine options to reshape risk and return.

What Is an Option Spread?

A spread involves buying one option and selling another option on the same underlying asset.

The options may differ in

- Strike prices
- Expiration dates
- Premiums

Spreads often reduce both

- Initial cost
- Maximum potential profit

Bull Call Spread

A bull call spread involves:

1. Buying a call with a lower strike
2. Selling a call with a higher strike

Both options normally have the same expiration. It is used when the investor expects:

A MODERATE PRICE INCREASE

Bull Call Spread Example

Buy the ETB 100 call for ETB 8 · Sell the ETB 120 call for ETB 3

$$\text{Net Premium} = 8 - 3 = \text{ETB } 5$$

Maximum Loss

- ETB 5

Break-Even

- $100 + 5 = \text{ETB } 105$

Maximum Profit

- $120 - 100 - 5 = \text{ETB } 15$

Bull Call Spread Outcomes

Expiration Price	Strategy Profit
ETB 90	-5
ETB 100	-5
ETB 105	0
ETB 110	5
ETB 120	15
ETB 130	15

The strategy limits both loss and profit.

Bear Put Spread

A bear put spread involves:

1. Buying a put with a higher strike
2. Selling a put with a lower strike

It is used when the investor expects:

A MODERATE PRICE DECLINE

Bear Put Spread Example

Buy the ETB 120 put for ETB 12 · Sell the ETB 100 put for ETB 4

$$\text{Net Premium} = 12 - 4 = \text{ETB } 8$$

Break-Even

- $120 - 8 = \text{ETB } 112$

Maximum Profit

- $120 - 100 - 8 = \text{ETB } 12$

Maximum Loss

- $\text{ETB } 8$

Long Straddle

A long straddle combines:

- Long call
- Long put
- Same strike price
- Same expiration

It may be used when the investor expects a large price movement but is uncertain about the direction.

Straddle Example

Strike price = ETB 100 · Call premium = ETB 7 · Put premium = ETB 6

$$\text{Total Premium} = 7 + 6 = \text{ETB } 13$$

Lower Break-Even

- $100 - 13 = \text{ETB } 87$

Upper Break-Even

- $100 + 13 = \text{ETB } 113$

Maximum Loss

- ETB 13 if the price ends at ETB 100

Long Strangle

A long strangle combines:

- An out-of-the-money call
- An out-of-the-money put
- Different strike prices
- Same expiration

It normally costs less than a comparable straddle but requires a larger price movement.

Strangle Example

Buy the ETB 110 call for ETB 4 · Buy the ETB 90 put for ETB 3

Total Premium = ETB 7

Lower Break-Even

- $90 - 7 = \text{ETB } 83$

Upper Break-Even

- $110 + 7 = \text{ETB } 117$

Collar Strategy

A collar combines a long underlying share, a long protective put and a short covered call.

Example: share price = ETB 100 · buy the ETB 90 put for ETB 3 · sell the ETB 115 call for ETB 3. The premiums offset each other.

Maximum Loss

- ETB 10

Maximum Gain

- ETB 15

Major Option Risks

Options involve:

Market Risks

- Leverage risk
- Time-decay risk
- Volatility risk
- Liquidity risk

Contract Risks

- Pricing risk
- Assignment risk
- Counterparty risk

Practical Risks

- Strategy complexity
- Transaction costs
- Total premium loss

Leverage and Total-Loss Risk

Options provide exposure using a relatively small premium. This creates leverage: small underlying-price changes may create large percentage changes in the option's value.

Important An option buyer may lose 100% of the premium even when the underlying asset moves only moderately.

Risk-Management Principles

Before trading options:

Define the Position

- Define the purpose of the position
- Understand every contractual obligation
- Calculate maximum gain and loss
- Calculate the break-even price

Assess the Market

- Consider time to expiration
- Assess volatility
- Check liquidity and spreads

Control the Risk

- Avoid excessive position size
- Monitor written options closely
- Do not treat premium income as risk-free

Integrated Practical Exercise

Apply the chapter

Given

- Current share price = ETB 100
- ETB 105 call premium = ETB 6
- ETB 115 call premium = ETB 2
- ETB 95 put premium = ETB 4
- Expected expiration price = ETB 115

Student Tasks

- Calculate the ETB 105 long-call profit
- Calculate its break-even price
- Calculate protective-put maximum loss
- Calculate the covered-call maximum profit
- Construct a bull call spread
- Calculate the spread's net premium
- Calculate its break-even price
- Calculate its maximum profit
- Recommend a strategy for a moderately bullish investor
- Explain the major risks

Instructor Answer Check

Long ETB 105 Call

- Profit = $(115 - 105) - 6$
= ETB 4
- Break-Even = $105 + 6 =$
ETB 111

Protective Put

- Maximum Loss = $100 - 95 + 4 =$ ETB 9

Covered ETB 115 Call

- Maximum Profit = $115 - 100 + 2 =$ ETB 17

Bull Call Spread

- Net Premium = $6 - 2 =$ ETB 4
- Break-Even = $105 + 4 =$ ETB 109
- Maximum Profit = $115 - 105 - 4 =$ ETB 6

Key Takeaways and Discussion

Key Takeaways

- A call provides the right to buy; a put the right to sell
- The buyer pays a premium for a right
- The writer receives a premium and accepts an obligation
- Payoff and profit are different
- Calls benefit from price increases; puts from decreases
- Moneyness describes intrinsic value — not total profitability
- Protective puts limit downside risk
- Covered calls generate income but cap upside
- Spreads limit both gains and losses
- Straddles and strangles benefit from large movements
- Options offer flexibility but involve leverage and total premium loss

Discussion Questions

- Why can an in-the-money option still produce a loss?
- When is a protective put appropriate?
- What does a covered-call investor sacrifice?
- Why is a naked call particularly risky?
- How do time and volatility influence premiums?
- When would an investor prefer a spread to a single option?
- What is the difference between a straddle and a strangle?
- Why is premium income not risk-free?

NEXT CHAPTER

Chapter 16: Option Valuation

- Intrinsic value and time value
- Put–call parity
- One-period binomial model
- Multiperiod binomial valuation
- Risk-neutral valuation
- Black–Scholes model
- Delta, Gamma, Theta, Vega, Rho
- Implied volatility
- Option-pricing limitations

THANK YOU

Questions and Discussion

Dr Abenet Yohannes, Ph.D.

abenetyohannes@gmail.com

abenetyohannes.com

