Academic Scheme Pack
CL Global Education Cambridge Programme
Business+Innovation+Engineering Course
I. Institution Introductions

University of Cambridge Colleges

The University of Cambridge is one of the world’s oldest universities and leading academic centres, and a self-governed community of scholars. Its reputation for outstanding academic achievement is known world-wide and reflects the intellectual achievement of its students, as well as the world-class original research carried out by the staff of the University and the Colleges.

The Cambridge Colleges are the setting for CL Global Cambridge Summer Programmes, providing the opportunity to experience Cambridge student life and learn from Cambridge University and Oxford University faculty members and academics.

CL Global

CL Global (Campus Life Global) is an education company aiming at promoting global learning and culture exchange. Having taken thousands of students to see the world, we are on a mission to make our academic programmes the best local experience for students. Besides Cambridge, we also run programmes in the US, Italy, Japan, and China. CL Global is accredited by the British Accreditation Council as a Short Course provider.

We believe in the power of connecting and sharing. We are a group of millennials with passion to build connections through education.

II. Programme & Course Design

This programme is aimed to be a supplement to the students’ home university curriculum, offering an opportunity for students to gain in-depth understanding from international experts on their subject while enjoying College Life in Cambridge.

The Course contains three specialized modules and one humanities module (Shakespeare & English Poetry). The lectures and supervisions add up to 42 Contact Hours during the 3-Week Programme Period. The core course modules are specified in the chart attached below. Learning beyond the classroom includes an organization visit and local cultural experiences. For information about Customized Programmes adapted to the students’ background, module topics could be discussed in further detail.

III. Course Outline

Lectures

The core

Lectures are the foundation of the course and typically last around a half-day with two short breaks. Lecturers are leading faculty members and academics from Cambridge University and Oxford University working at the forefront of their fields, so lectures are a fantastic opportunity to discover the latest research and developments.

Supervisions

In-depth exploration

This system of more personal tuition is one of the greatest strengths of teaching in Cambridge. Supervisions provide the opportunity to explore the subject more deeply, discuss questions and ideas, and receive feedback.

- Supervisions are small-group sessions that are organised by PhD researchers in the field.
- Students undertake preparation for each supervision -- usually reading, writing, or working on problem sets.
Practicals
In practicals, professors guide students in applying the knowledge they have learned from lectures. In the engineering course modules, students participate in a lab session. The business courses use case studies to engage students in discussion on real scenarios. In the humanities course, students apply their skills through a seminar or workshop.

Organization visits
The course includes the opportunity to learn outside the classroom through an organization visit. The visit provides context for the course concepts and helps students expand their understanding of how academic knowledge can be applied in real life situations.

IV. Course Facts

Entry Requirements
English Language: Selection process will be fully given to universities. It’s recommended that selected students have the level of English equivalent to IELTS 6.5 / TOFEL 80 or above.
Prerequisite: Some courses will require prerequisite knowledge of certain area or subjects. Please check Course Details for information

Study Hours
Duration: Three weeks
Faculty Contact Time: A minimum of 42 hours; Lecture: 33 hours; Supervision: 9 hours. (Some course schedules vary)
Recommended Self-study: 10 hours of self-study per module, including required course material pre-reading and preparation of assessment/group projects.

Assessment and Transcript
Assessment: each course will contain assessment for grading. Depending on the nature of the course, assessment will be taken in the form of project presentation, written exam or course work.
Transcript: course transcript will be given at the end of the programme with assessment results.

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V. Course Details

I Business Course Core Modules

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**Finance & Accounting**

**Behavioral Finance**

Overview

Behavioral finance is a new field in finance, which has been the subject of an increasing amount of research over the last few years. Over the entire history of finance research, it has been believed that markets are efficient and that prices reflect fundamental values. One reason for these beliefs is that even if investors are biased, these biases should not be systematic. In other words, while different investors may have different biases, these biases should all wash out in the cross-section. In addition, even if investors are systematically biased, unbiased rational investors should be able to take advantage of these biases and irrational investors should eventually be driven out of the market – a survival of the fittest type argument.

Over the last decade however, a number of researchers have documented that, contrary to the efficient markets and portfolio theory hypotheses, anomalies can be observed in returns to firms after an enormous variety of corporate events – from mergers to share repurchases to stock splits.

In this course, we will examine whether behavioral biases influence managerial and investor actions. We will examine behavioral decision traps – obstacles that might stand in the way of the normative ideal of value maximization. We will also examine how the insights of behavioral finance complements the traditional paradigm and sheds light on the behavior of asset prices, corporate finance, and various Wall Street institutions and practices.

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**International Economics & Politics**

**Globalization and Regional Economic Institutions**
Overview

After an overview of the main themes of macroeconomic analysis, the classes in this course will loosely follow the structure and contents of major textbooks in International Economics. Two good examples of the genre are

- Pugel, T. (2011). International Economics, New York, McGraw Hill. You may find it useful to refer to consult these textbooks as good general reference works; an important feature of this course, however, is that you will be encourage to widen your learning by exploring a variety of policy-oriented, current resources from discussion papers, to official documents, to podcasts of relevant radio programs, official speeches etc. Some preparatory suggestions are included here; more will be provided during the course on a dedicated website.

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Investment & Industrial Analysis

Economics and Investment

Overview

First, we will discuss how economic variables affect financial markets and, in particular, stock prices and interest rates. We will examine and interpret information from the Financial Times, seeing in practice what the most important economic indicators are.

Secondly, the ultimate goal of corporations is to take on the best possible projects (e.g., a plant expansion) and finance them the best way possible (e.g., issuing debt or equity). The time and uncertainty of investment payoffs make these problems nontrivial and essential for long-term success. One of the main question of Corporate Finance is to answer how to value and choose projects and to value of a company?

The aim of our sessions is to give you a framework to understand and answer these issues in theory and practice. We will apply basic concepts to talk about techniques that are the main workhorses of valuation: Multiples and Discounted Cash Flows (DCF) valuation.

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Financial Innovation & Business Project Case Study

REITs, Group Project and Business Presentation

Overview

This course introduces and develops an understanding of the analytical techniques necessary to make effective real estate investment decisions. The course begins with an introduction to global real estate markets, real estate development and investment valuation using discounted cash flow projections, investment performance evaluation based on net present value (NPV) and internal rate of return (IRR). More advanced topics in real estate finance and risk analysis will focus on capital structure considerations between equity and debt finance, real estate investment trusts (REITs), and the subprime crisis in the USA and Europe.
Teaching methods include formal lecture sessions on cash flow methods combined with practical examples. Excel based appraisal and performance evaluation techniques will be used to give course participants an opportunity to apply them to property development and investment deals. The techniques taught are of practical benefit to participants and transferable to the workplace.

II Innovation and Entrepreneurship Course Core Modules

Business Models

Module Learning Outcomes

On completion of this module the student will have gained an understanding of:

- The importance for start-ups to develop a robust business model
- Different types of business model and their impact on business structure
- Tools for developing the business model

Module Description

In order to build a successful business it is critical to have a clear view of how the business will create a revenue stream, how it will reach its customers and how it fits in to the industry value chain. Entrepreneurially led start-up businesses have the freedom and flexibility to choose business models that can disrupt an industry sector and either build on the strengths of the new business, or mask the weaknesses of the business. Investors, in particular, will want to gain a clear understanding of the business model before they invest.

Module Delivery

Students will be encouraged to question and discuss the information presented in the module, and will be asked to reflect on businesses that they are familiar with to see which business models those companies deploy.

Cambridge Phenomenon & Cambridge Ecosystem

Module Learning Outcomes

On completion of this module the student will have gained an understanding of:

- The history of technology commercialisation in Cambridge
- The growth of Cambridge into Europe’s leading technology cluster
- How the Cambridge ecosystem continues to support and encourage economic growth

Module Description

Cambridge is recognised as one of the world’s leading science and technology based ecosystems. Established around the core of a world leading research university this module explores how a successful cluster evolved and grew and what factors are behind its success. Students will also see how other technology clusters have evolved and will consider similarities and differences with their own environment.

Module Delivery
Students will be encouraged to question and discuss the information presented in the module, and will be asked to reflect on how technology clusters have developed in their own country. Students will undertake a short group exercise which will allow them to consider how Cambridge might have evolved under different circumstances.

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**Value Proposition**

**Module Learning Outcomes**

On completion of this module the student will have gained an understanding of:

- The importance for businesses to develop a clear and compelling value proposition
- The difference between product features and customer value
- Tools for developing the value proposition
- How the value proposition is the lead component of the Business Model Canvas

**Module Description**

For a new product or new business to succeed it is critical to be able to identify and articulate the true value of the business proposition for both the end user, and the customer (which may not be the same for these two stakeholders). In spite of this it can be extremely difficult to develop the value proposition, especially in the case of highly innovative concepts, or where new products or services are driven by “technology push” rather than “customer pull”.

**Module Delivery**

Students will be encouraged to question and discuss the information presented in the module, and will be asked to reflect on businesses or products that they are familiar with to identify the value propositions that apply and to evaluate how successful those companies are at articulating the value.

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**Team Building**

**Module Learning Outcomes**

On completion of this module the student will have gained an understanding of:

- The importance for start-ups of building and growing a successful team
- Management styles & team dynamics in a start-up business
- Theories about team member profiles and team dynamics
- Investor views about start-up teams

**Module Description**

Effective teams are vital to the success of a start-up business, and most investors view the team to be as important to their decision to invest as the technology being commercialised by the company. The factors influencing the effectiveness of the team include the psychological and behavioural make-up of the team individuals, the composition of the team and the management style and dynamics within the team.

**Module Delivery**
Students will be encouraged to question and discuss the information presented in the module, and will be asked to reflect on high profile business leaders that they are familiar with. Students will undertake a short group exercise which will allow them understand the theories in a practical context.

III Engineering Course Core Modules

Nanotechnology

Overview

Nanotechnology, or Small is good. We will take a look at Nanotechnology in everyday use, gain an understanding of the basic underpinning principles and see where this exciting field is heading. We will start by looking at the origins of nanotechnology, deep in the mists of time when science thought it had all the answers, and then it became clear from one discovery after another that this was not the case. From Quantum mechanics to relativity, science was shaken at its roots over a century ago, and this led to the interest in all things small. We will then look at what nanotechnology really is, and how and why the properties of nanometer-sized objects are fundamentally different to larger things, and how we can take advantage of this. We will look at specific examples of nanotechnology applications in healthcare, electronics, textiles, defence, automotive industry, fuels, food, etc. We will also look at how we explore the properties of nanometer sized things, and get some hands-on experience with scanning probe microscopes that are used to image things at these length scales.

Materials and Sustainability

Overview

The evolution of materials through the history of mankind is deeply interlinked to man’s impact on the environment. Materials and products will also play a substantial role in building a sustainable future in reducing energy use, mitigating emissions, and managing solid waste.

The course is divided into two main sections. The first section will discuss how to design products keeping sustainability in mind. The second section will introduce you to classes of advanced materials, including natural and composite materials, which have potential to help us in meeting sustainability targets. The course will start with an overview of global production and consumption of materials and their impact on the environment. We will introduce ideas including the ‘life-cycle’ of a product, and how to use ‘life cycle assessment’ as a tool to quantify environmental impact, and inform better decision-making in material and process selection, and product design. This will be complemented by exploring the use of materials selection charts and also explore eco-auditing tools on the Cambridge CES Selector software.

In the next section, we will begin by understanding how (and why) we can use nature as an inspiration to design for sustainability. We will use spider silk and wood as case study ‘model’ materials. We will also explore how biocomposites are offering new opportunities in various engineering applications. Finally, by conducting a simple life cycle assessment, we will explore whether all green materials are really green.

Renewable Electrical Power

Overview
This course will start with an overview of the various technologies that underpin the generation of electricity from renewable sources, and explain the relative importance of each technology.

Wind power is by far the most rapidly increasing contributor to renewably-produced electricity, and so the rest of the course will focus on the science and engineering of wind turbines. We will also consider the economics of running a wind farm to achieve optimal financial return.

Finally, through a group assignment, we will look at applying the course material to consider which of four alternative systems leads to the best return on investment: offshore fixed speed turbines; offshore variable speed turbines; onshore fixed speed turbines; onshore variable speed turbines. Each group will give a short presentation at the end of the course to disseminate their findings.

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**Semiconductor Engineering**

**Overview**

The lectures would be on the following topics:

- The pn Junction Diode
- Current Flow in the P+n Junction
- Metal-Semiconductor Junctions
- The BJT & HBT
- The MOSFET (Part 1)
- The MOSFET (Part 2)

The students are expected to answer a short quiz after the course to assess their understanding of the topics covered.

**Prerequisites**

The students should already have an understanding of basic semiconductors, including the band gap, Fermi Energy, effective density of states in the Conduction and Valence Bands, and carrier concentrations in the conduction and valence bands.

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**Applied Information Theory**

**Overview**

This course will introduce the concepts of information theory, data compression and error correction that are essential building blocks in the design of communication and storage systems. We will review the probability theory of discrete random variables, introduce fundamental measures of uncertainty and information, and derive the fundamental limits of communication and storage. Furthermore, we will learn a number of practical compression and error control algorithms that enable operation close to the theoretical limits. An outline of the material to be taught is as follows:

- review of discrete probability theory
- entropy, uncertainty
- fundamental limits of data compression
- Huffman coding and arithmetic coding
- mutual information
- fundamental limits of reliable transmission / storage
- linear codes
- low-density parity-check codes
The Shakespeare Syllabus

Classes will involve reading and understanding Shakespeare's original text, working in small groups with other students, and dramatic performance.

Shakespeare Class 1: 'A drum, a drum! Macbeth doth come!' Introduction to Shakespeare's language and the plot of the play Macbeth

Shakespeare Class 2: 'If it were done when tis done, 'twere well it were done quickly...' Close study of an important speech by the central character, Macbeth, to understand language and character

Shakespeare Class 3: 'Fair is foul and foul is fair' The three witches: understanding and performing the opening scene of Macbeth

Shakespeare Class 4: 'Screw your courage to the sticking-place and we'll not fail' Studying and representing the relationship between Macbeth and Lady Macbeth

The Poetry Syllabus

This short course will enable students to engage with real poetry in English, both serious and light-hearted, by linking awareness of language with classic examples of verse from the late 16th century to the present. There will be individual and group exercises that draw attention to important features of verse, and the chance to analyse more deeply and reflect on the power of poetry.

Depending on student progress and interest there will be some flexibility about exactly which poems are studied in class and which will be given as suggested extension activities.

Poetry Class 1: The heart of the matter  An introduction to basic features of poetry in English, looking at ideas, rhyme and rhythm.

Poetry Class 2: Listen up Cementing the features from class 1, adding some other language effects that are about sound in particular, and considering the relationship between humanity and the natural world in two classic lyric poems.

Poetry Class 3: Look closely Considering how visual form relates to meaning in examples of "shape poetry". Some essential cultural background.

Poetry Class 4: Get Donne done  Analysis of and response to a famous sonnet from the age of Shakespeare.
V Organization Trip
One of the following visits will apply:

**LONDON STOCK EXCHANGE GROUP**

London Stock Exchange is one of the world’s oldest stock exchanges and can trace its history back more than 300 years. London Stock Exchange Group was created in October 2007 when London Stock Exchange merged with Milan Stock Exchange, Borsa Italiana.

London Stock Exchange Group (LSE.L) is a diversified international market infrastructure and capital markets business sitting at the heart of the world’s financial community. The Group can trace its history back to 1698.

The Group operates a broad range of international equity, bond and derivatives markets, including London Stock Exchange; Borsa Italiana; MTS, Europe’s leading fixed income market; and Turquoise, a pan-European equities MTF. It is also home to one of the world’s leading growth markets for SMEs, AIM. Through its platforms, the Group offers international business and investors unrivalled access to Europe’s capital markets.

Post trade and risk management services are a significant part of the Group’s business operations. In addition to majority ownership of multi-asset global CCP operator, LCH Group, LSEG operates CC&G, the Italian clearing house; Monte Titoli, the T2S-ready European settlement business; and globeSettle, the Group’s newly established CSD based in Luxembourg.

The Group is a global leader in indexing and analytic solutions. FTSE Russell offers thousands of indexes that measure and benchmark markets around the world. The Group also provides customers with an extensive range of real time and reference data products, including SEDOL, UnaVista, and RNS. London Stock Exchange Group is a leading developer of high performance trading platforms and capital markets software for customers around the world. In addition to the Group’s own markets, over 35 other organisations and exchanges use the Group’s MillenniumIT trading, surveillance and post trade technology.

Headquartered in London, with significant operations in North America, Italy, France and Sri Lanka, the Group employs approximately 4,700 people.

**Barclays Eagle Labs Incubator**

From accelerating UK business, enabling collaborative innovation to digital empowerment for everyone, Barclays Eagle Labs are here to give your idea the space to grow. Their main missions being:

- **Accelerating UK business**
  Providing support for high potential and high-growth businesses that are starting and scaling-up through access to expert networks and learning opportunities.

- **Enabling collaborative innovation**
  Facilitated sessions for large corporates to benefit from the agility and innovative thinking from start-ups and scale-ups.

- **Digital empowerment for everyone**
  Giving the community access to the skills and training they need to thrive.
Plant Oxford is the birthplace and heart of MINI production. Manufactured to individual customer specifications, hundreds of MINIs leave the plant’s assembly lines each day, off to meet new owners in more than 110 countries around the world.

Three UK plants have had a part to play in MINI production – Plant Hams Hall makes engines, Plant Swindon produces body pressings and sub-assemblies for MINI, and all this comes together at Plant Oxford with body shell production, paint and final assembly.

Since production of the new MINI started in 2001, almost 3 million cars have been made at Plant Oxford. But the plant’s heritage goes back much further than that – it is a site with 100 years of automotive manufacturing history, which has become a landmark in the “city of dreaming spires”.

The Cavendish Laboratory has an extraordinary history of discovery and innovation in Physics since its opening in 1874 under the direction of James Clerk Maxwell, the University’s first Cavendish Professor of Experimental Physics. Up till that time, physics meant theoretical physics and was regarded as the province of the mathematicians. The outstanding experimental contributions of Isaac Newton, Thomas Young and George Gabriel Stokes were all carried out in their colleges. The need for the practical training of scientists and engineers was emphasised by the success of the Great Exhibition of 1851 and the requirements of an industrial society. The foundation of the Natural Sciences Tripos in 1851 set the scene for the need to build dedicated experimental physics laboratories and this was achieved through the generosity of the Chancellor of the University, William Cavendish, the Seventh Duke of Devonshire. He provided £6,300 to meet the costs of building a physics laboratory, on condition that the Colleges provided the funding for a Professorship of Experimental Physics. This led to the appointment of Maxwell as the first Cavendish professor.

Since the founding of the Nobel Prizes by Alfred Nobel in 1895, 29 members of the Cavendish have won one of the illustrious prizes. Note that not all of the Prizes are in physics.

The next phase of development is the reconstruction of the Laboratory to meet the challenges of the 21st century. The necessary major redevelopment programme continues the tradition of innovation and originality that has been at the heart of the Laboratory’s programme since its foundation.