The summaries were prepared by ChatGPT based on the presentations.

Topic 1. Economics: Basic Issues (14)
• 1.1: Capitalism solves the extremely difficult economic problem by dividing it into sub-problems and coordinating them with the price mechanism, although this generates structural problems. (14 slides)

Topic 2. Markets: Supply and Demand (81)
• 2.1: Prices act as signals that regulate production and consumption according to scarcity and profitability. (25 slides)
• 2.2: Marshall's partial equilibrium analyzes isolated markets, but ignores interactions. (39 slides)
• 2.3: General equilibrium shows efficient coordination in theory, but its assumptions are unrealistic and empirically questionable. (17 slides)

Topic 3. Market, Efficiency, and Public Interventions (49)
• 3.1: Price controls can generate inefficiencies if they are not applied with clear criteria and awareness of their side effects. (49 slides)

Topic 4. Supply, the Firm, and Costs (30)
• 4.1: The firm emerges to solve the economic problem locally, through specialization, reducing transaction costs, and confronting market uncertainty. (30 slides)

Topic 5. Perfectly Competitive Markets (59)
• 5.1: Perfect competition is an ideal model that does not exist in reality, and its normative character is questionable. (15 slides)
• 5.2: Competitive firms maximize profits by producing until marginal revenue equals marginal cost. (10 slides)
• 5.3: Capitalist economic calculation focuses on maximizing profits, not on satisfying human needs. (19 slides)
• 5.4: The price mechanism in capitalism acts similarly to algorithms for solving the economic problem mathematically. (15 slides)

Topics 7 and 8. Market Failures, Equity, and Redistribution (166)
• 7-8.1: Although the market resolves the allocation of resources, it does so at the cost of structural problems such as dehumanizing the economy. (7 slides)
• 7-8.2: Capitalism has structural flaws such as inequality, inefficiency, unemployment, and recurring crises. (6 slides)
• 7-8.3: Capitalist logic prevents the achievement of collective goals because it fragments decision-making. (12 slides)
• 7-8.4: Economic inequality, both within and between countries, is structural to capitalism and tends to worsen. (26 slides)
• 7-8.5: Capitalism tends to reduce human beings to a means of production, losing sight of well-being as an end in itself. (23 slides)
• 7-8.6: Automation and artificial intelligence could make humans dispensable in the capitalist system. (13 slides)
• 7-8.7: The welfare state has humanized capitalism, but it faces internal and external challenges that threaten its sustainability. (45 slides)
• 7-8.8: State revenues come mainly from taxes and contributions, and allow for the

financing of essential public services. (17 slides)
• 7-8.9: Public spending reflects the social priorities of the state and is key to sustaining well-being and social cohesion. (17 slides)

Topic 9. Economic Aggregates (137)
• 9.1: GDP measures the monetary value of a country's final output, but not how it is distributed or whether it improves well-being. (19 slides)
• 9.2: GDP does not include unpaid work, the informal economy, or environmental impacts, making it insufficient as a measure of development. (22 slides)
• 9.3: GDP per capita, both real and PPP, allows for more accurate comparisons of living standards between countries and over time. (34 slides)
• 9.4: Unemployment is measured by the EPA (Labour Force Survey) and reveals both cyclical and structural problems in the labor market. (40 slides)
• 9.5: Inflation measures the generalized increase in prices and directly affects economic life and monetary policy. (22 slides)

Topic 10. Business Cycles and Long-Term Growth (151)
• 10.1: Economic growth can follow exponential or logistic trajectories, depending on the environmental constraints. (Slide 29)
• 10.2: In a logistics-driven world, increasing the investment rate does not increase long-term consumption, but rather accelerates resource depletion. (Slide 21)
• 10.3: Population evolution depends on birth rates, death rates, and age structures, which can be mathematically modeled. (Slide 34)
• 10.4: Sustained economic growth is a historical exception made possible by the Industrial Revolution and technological progress. (Slide 9)
• 10.5: Modern economic cycles reflect internal dynamics of capitalism, with recurring phases of expansion and crisis. (Slide 25)
• 10.6: Economic cycles arise from structural imbalances between decentralized decision-making and the system's resource limits. (33 slides)

Topic 11. Three Centuries, Three Failures (101)
• 11.1: The unfettered capitalism of the 19th century, the real socialism of the 20th century, and the welfare state of the 21st century have shown structural limitations that call their sustainability into question. (5 slides)
• 11.2: The strong economic growth in England in the 1800s did not improve living conditions, showing that pure capitalism prioritizes profit over human needs. (22 slides)
• 11.3: Socialism has evolved from cooperative ideals to authoritarian systems, which also proved economically inefficient. (42 slides)
• 11.4: The debate on economic calculation in socialism illustrates that, although fully centralized planning is theoretically possible, it is not viable in practice today. (32 slides)

Topic 12. History of Economic Theory (201)
• 12.1: Economic theory is in crisis because no school adequately explains either the functioning or the problems of capitalism, nor does it provide solid guidelines for policy. (12 slides)
• 12.2: Classical economists study pure capitalism, where prices correspond in the long run to the cost of production and tensions arise between classes. (27 slides)

• 12.3: The Magna Dynamics of the classical economists are described, as well as Marx's analysis. (39 slides)
• 12.4: Neoclassical economists focus their analysis on prospective subjective utility and marginalism to explain prices and individual decisions. (27 slides)
• 12.5: General equilibrium studies prices as coordinators of individuals' decisions. (Slide 24)
• 12.6: Optimization formalizes the efficient allocation of resources, viewing prices as marginal signals under constraints. (Slide 20)
• 12.7: Reproduction theory views the economy as a circular process where the key is maintaining the productive system. (Slide 29) • 12.8: A synthesis integrating the five perspectives studied is necessary for a complete view of value. (
Slide 23)

- **Topic 1. Economics: basic issues.**

1.1. The economic problem; how capitalist systems solve it (class of February 14)
PPTX file

The document addresses the **economic problem** from its simplest form, using the Robinson Crusoe example, to its complexity in advanced capitalist societies. It explains that in a modern economy, centralized resource allocation is impossible due to the enormous amount of information and calculations required. In capitalism, **resource allocation** is resolved locally **within each firm** , whose objective is to maximize profit, without considering the economy as a whole. **Coordination** occurs through the **price mechanism** : if a good is scarce, its price rises, incentivizing its production; if it is abundant, its price falls, reducing its production. Market competition forces firms to **maximize profit** to survive, which can lead to the exclusion of firms with other objectives. Adam Smith's ideas on the "invisible hand" and Hayek's argument for the impossibility of centralized socialism are discussed, although the viability of decentralized models is acknowledged. The **problems of capitalism** are also analyzed , such as its inefficiency in maximizing overall profit, economic instability, inequality, and the fact that profit maximization does not equate to satisfying human needs. Mechanisms like the welfare state have emerged to mitigate these problems, but if these were to disappear, pure capitalism could dehumanize the economy, reducing human beings to mere inputs replaceable by machines or artificial intelligence.

- **Topic 2. Markets: supply and demand.**

2.1. Scarcity, prices, profitability and regulation of the economy (class of February 21)
PPTX file

The document analyzes how capitalism solves the economic problem through the **allocation and coordination** of resources, highlighting the importance of **competition and profit maximization** . It explains that each firm makes production decisions locally, without considering the economy as a whole, using information on available inputs and processes to maximize its profitability. Coordination between firms occurs through the **price mechanism** : when a good is scarce, its price rises, incentivizing its production, and when it is abundant, its price falls, discouraging it. This automatic adjustment is the foundation of economic regulation in a pure capitalist system, where firms always seek

to maximize profit to survive in a competitive environment. Furthermore, the document addresses the concept of diminishing returns and the "law of supply and demand," explaining how **prices reflect the profit a good can generate** . It also mentions that even in cooperative systems or market anarchy, competitive pressure would lead to profit maximization, hindering the implementation of alternative economic models without some intervention. Finally, traditional supply and demand models, based on classical economic theory, are presented to illustrate market equilibrium and its impact on production and consumption.

2.2. Partial Equilibrium (class of February 28) PPTX File

The document discusses the concept of **partial equilibrium** developed by Alfred Marshall, an approach that studies specific markets in isolation, based on the premise that it is possible to analyze the supply, demand, and price of a good without considering the rest of the economic system. This contrasts with Walras's **general equilibrium** , which examines the interdependence of all markets. Marshall introduced the graphical representation known as **"Marshall's scissors,"** where the supply curve rises and the demand curve falls, meeting at an equilibrium point that determines the market price. Although partial equilibrium is considered a useful teaching tool today, it has been widely criticized by various economic schools of thought: Keynes pointed out that the approach ignores the problems of unemployment and macroeconomic imbalances; Sraffa questioned the validity of upward-sloping supply curves in perfect competition; Walras argued that the interdependence of markets invalidates partial analysis; and Samuelson exposed mathematical inconsistencies. Stiglitz and Akerlof demonstrated that imperfect information prevents efficient equilibrium, and Robinson pointed out that the model ignores imperfect competition. Furthermore, the paper addresses the **cobweb model** , a dynamic illustration of price and quantity adjustments in markets where output is time-lagged. Depending on the slopes of the supply and demand curves, the system can be stable (converging to equilibrium), neutral (constant oscillations), or unstable (diverging from equilibrium). Although classical theory assumes that prices tend to equilibrate, the cobweb model shows that this is not always the case, and that prices and output can fluctuate indefinitely. Ultimately, the paper highlights the limitations of partial equilibrium as a scientific tool and underscores the importance of considering more comprehensive approaches to understanding how markets function.

2.3. General Equilibrium (class of February 28) PPTX File

The document on **general equilibrium** analyzes the development of this economic theory from its origins with the Physiocrats to its formalization with the mathematical models of Walras, Pareto, Cassel , Arrow, and Debreu . It examines how **prices act as a coordination mechanism** between producers and consumers in a competitive market, allowing a state to be reached in which no agent can improve their situation without negatively impacting another. The fundamental theorems demonstrating that, under certain conditions, general equilibrium leads to an efficient allocation of resources are presented. However, the **lack of empirical evidence** for the model is criticized, as it assumes that agents can perfectly predict the future and that the market always adjusts automatically, ignoring phenomena such as economic crises, unemployment, and production imbalances. Furthermore, **internal inconsistencies in the model have been identified, such as the** Sonnenschein -Mantel- Debreu theorem , which demonstrates

that the aggregate behavior of markets is not always stable or predictable. The **Leontief input-output model** is also mentioned , which offers an alternative approach to general equilibrium by studying the **interdependence** between productive sectors using mathematical equations. In conclusion, although general equilibrium has been a key reference point in economic theory, its limitations have led to questions about its applicability in reality and have driven the search for more dynamic and realistic models that better explain contemporary economic problems.

- **Topic 3. Market, efficiency and public interventions.**

3.1. Price and Quantity Controls (February 28th class) PPTX File

The paper on partial equilibrium and price and quantity controls analyzes how market regulations can affect production, consumption, and economic well-being. It explains that a **price ceiling** below equilibrium generates scarcity, as producers have less incentive to supply goods, while a **price floor** above equilibrium leads to excess supply and reduced demand. It also questions the idea that the market always tends toward equilibrium, pointing out that cyclical unemployment and economic crises demonstrate flaws in this theory. A critique of pure capitalism is presented, using **19th-century England as an example** , where, despite economic growth, living conditions did not improve: real wages declined, life expectancy remained low, and working hours were extremely long. It argues that the market alone does not guarantee the well-being of the population and that economic interventions, such as the welfare state and labor regulations, have been essential for improving the quality of life. However, the report also warns of the risks of implementing price controls without proper analysis, citing historical examples where such policies have led to economic crises and shortages. In conclusion, the document emphasizes the **need for cautious market regulation** , considering both the economic efficiency and the social impact of the policies implemented.

- **Topic 4. Supply, the firm and costs.**

4.1. The offer; the company and the costs (class of March 7) PPTX file

The document analyzes the firm as an essential economic unit in the capitalist system, explaining how its existence responds to the **need to divide and coordinate the allocation** of resources. It highlights that firms allow **for reduced costs** in information, calculation, and execution, facilitating efficient production and the adoption of advanced technologies. Specialization **plays** a key role in simplifying the economic problem, allowing each firm to focus on a specific task, similar to cell differentiation in living organisms. Furthermore, **internal planning** within firms is examined, showing that, although capitalism operates through the market, each firm functions as a planned economy internally. Decision-making under uncertainty is addressed, as entrepreneurs must anticipate the future of the market without complete information. The evolution of business management is also reviewed, from the individual entrepreneur of the 19th century to modern management in which multiple actors participate in administration. Different organizational structures, from hierarchical to horizontal, and their impact on efficiency are explained. Furthermore, **theories about the firm** are presented , ranging from the neoclassical perspective to Coase's transaction cost theory, which explains that firms emerge to minimize market costs. Production models are analyzed, including the importance of inputs and production functions such as the Cobb-Douglas function,

along with key concepts regarding costs, productivity, and returns to scale. Finally, the influence of **firm size** on efficiency and structure is explained, highlighting that the balance between transaction costs and internal organization determines its optimal size.

- **Topic 5. Perfectly competitive markets.**

5.1. Perfect Competition and Equilibrium (March 14th Class) PPTX File

The document examines the concept of **perfect competition** from two main perspectives: as **a theoretical model** for analyzing market dynamics and as a **normative guideline** for economic policymaking. It establishes that perfect competition is based on a series of strict assumptions, such as the existence of numerous price-takers, homogeneous goods, perfect information, the absence of barriers to entry, and full mobility of productive resources. It also analyzes its relationship to **market equilibrium , highlighting that the Arrow- Debreu** theory describes this equilibrium without explaining how it is achieved in reality. Despite its importance in economic theory, it argues that perfect competition has never existed in practice, and that even in societies that have come closest to this ideal, such as 19th-century England, problems like economic crises, unemployment, and inequality have persisted. Furthermore, it criticizes the assumption that the equilibrium resulting from perfect competition is automatically **desirable** , since **Pareto optimality** does not guarantee a fair distribution of wealth, allowing for scenarios where a single person owns almost everything while others live in poverty. The role of the model in public policy formulation is also discussed, noting that many economists have advocated its application to reduce "market failures," even if this means eliminating differences between reality and the ideal conditions of the model. However, it is cautioned that perfect competition does not address global problems such as **climate change** or the efficient allocation of resources from a human and social perspective. Finally, the document reflects on the tendency in economics to conflate theoretical models with political objectives, highlighting that assuming perfect competition as an ideal to be achieved can be problematic, since there is no evidence that it would lead to a better quality of life for society as a whole.

5.2. Profit Maximization (March 21st class) PPTX File

The document explores how firms make economic decisions in a competitive market, especially in near- **perfect competition environments** , where they act as **price-takers** and cannot influence the price of the goods they sell or the inputs they acquire. Their central objective is to **maximize profit** , which involves analyzing possible resource allocations, calculating which strategy generates the highest profitability, and executing it efficiently. To this end, the concepts of **marginal revenue** (the additional revenue from selling one more unit), **marginal cost** (the additional cost of producing that unit), and **marginal benefit** (the difference between the two) are introduced, establishing the key rule that a firm should increase its output until marginal revenue equals marginal cost. Profit maximization is also analyzed from the perspective of input use, noting that a firm will only hire more workers or acquire more resources if the **marginal revenue of the input** is greater than or equal to its **marginal cost** . Although profit maximization is the guiding principle for most companies, the document mentions other possible objectives, such as long-term business growth, prioritizing the interests of entrepreneurs over shareholders, or focusing on stakeholders (employees, customers,

communities), though these approaches are more common in less competitive markets. The **Thünen marginal productivity principle is introduced** , which states that the price of productive inputs (land, capital, labor) equals their **marginal productivity** , but it is noted that this principle does not explain how income is distributed in society. Finally, a practical case study on business valuation is presented, based on the film * *Other*. " People's Money* " illustrates how a company can be worth more if it is dismantled and sold off for parts than if it continues operating, highlighting how capitalist logic prioritizes profitability over other factors. In conclusion, the document underscores that, in capitalism, all business decisions are determined by efficiency and profit maximization, which can lead to a resource allocation that does not necessarily prioritize social welfare or sustainable development, but rather the constant pursuit of profitability.

5.3. Economic Calculation, Value and Accounting (Optional; not included in the exam) PPTX File

This document examines **economic calculation** as a fundamental tool for the optimal allocation of resources in different economic systems. It introduces **constrained maximization** , a mathematical problem that seeks to optimize an objective under certain limitations. The use of **Lagrange multipliers** , which measure how a change in resources affects the objective to be maximized, is explained. Economic calculation in **capitalism and socialism is compared** , noting that in the former, the goal is profit maximization, while in a hypothetical socialist system, the satisfaction of needs would be prioritized. The concept of **value is developed** , explaining that in capitalism, value is measured by the benefits a good generates, while in socialism, it could include other criteria, such as its social or ecological utility. **Economic accounting is also analyzed** , which in capitalism measures the profitability of processes, while in socialism, it would evaluate their contribution to overall well-being. The application of mathematical models from capitalist systems to socialist systems is criticized, as they do not consider objectives other than profit maximization. Finally, a reflection is raised on why the global economy follows a productivist model focused on maximizing profit and not on human well-being.

5.4. Prices as signals (Optional; not included in the exam) PPTX file

The paper analyzes the role of prices in capitalist economies, presenting them as signaling mechanisms that guide production and resource allocation toward profit maximization. It identifies three types of prices in capitalist systems: **exchange rates** (externally determined market prices), **weights** (internal prices set by firms to maximize profits), and **Lagrange values or multipliers** (implicit prices derived from optimization calculations). Although different in nature, these prices tend to be proportional in capitalist systems, unlike in other economic forms where they may diverge or even be nonexistent. The paper compares these dynamics with alternative societies such as planned socialisms or scenarios like Robinson Crusoe's Island, showing that prices can also operate under different logics depending on the allocation objective (e.g., maximizing needs rather than profits). Furthermore, it introduces the idea of **economic mechanisms as real-world algorithms** , comparable to mathematical algorithms that solve constrained optimization problems using strategies such as "divide and conquer." In this sense, **capitalism functions as a large, decentralized algorithm** that coordinates multiple allocation units (firms) through the market. Finally, the possibility of **market**

socialism is considered —that is, a socialist economy that maintains market mechanisms but with accounting and values distinct from those of capitalism. It is concluded that **the essence of capitalism is the logic of profit maximization** as a consequence of market competition, of the way in which the allocation and coordination of resources are organized, and not the existence of a capitalist class.

- **Topic 9. Economic Aggregates**

9.1. Definition, measurement and components of GDP (class of March 28) PPTX **file**

This document discusses **Gross Domestic Product** (GDP), explaining its definition, methods of measurement, components, and limitations. GDP is defined as the *monetary value of all final goods and services produced within a country for the market during a specific period* , regardless of the nationality of the producers, as long as production takes place within the national territory. **Intermediate goods are excluded** to avoid double counting, and only current production intended for the market is considered. There are three methods for estimating GDP: the **value-added method** (the difference between sales and intermediate goods), the **income method** (the sum of income: wages, interest, rent, and profits), and the **expenditure method** (the sum of consumption, investment, government spending, and net exports). Although these methods approach the calculation from different angles, they all lead to the same result. The document also distinguishes between **GDP at market prices** (detailing the expenditure method and the **components of GDP**) and GDP at factor cost, and explains how these are related through indirect taxes and subsidies. Other concepts are also presented, such as Gross National Product (GNP), which considers the production of nationals regardless of the country in which it takes place, and Net Domestic Product (NDP), which discounts the depreciation of capital. Finally, the limitations of GDP as a measure of well-being are highlighted, citing Simon Kuznets and other authors who warn of the need to consider the quality of growth and its social and environmental implications, and not just quantitative growth.

9.2. Limitations of GDP (class of March 28) PPTX **file**

The document delves into the limitations of Gross Domestic Product (GDP) as a measure of a society's well-being and development, highlighting that while it is useful for quantifying the production of goods and services, its scope is restricted and can lead to misinterpretations if used as the sole indicator of progress. First, GDP does not consider **how wealth is distributed** , so it can grow while social inequalities worsen. Furthermore, **it excludes the value of unpaid activities** such as domestic work, caregiving, and volunteering, which are essential for collective well-being. It also fails to account for the **informal economy** , which is prevalent in many countries, or the quality or sustainability of economic growth. In this sense, GDP **does not reflect the environmental costs** of production, such as pollution or the depletion of natural resources, and therefore, can promote an unsustainable development model. Similarly, it does not measure **subjective or qualitative aspects of well-being** , such as mental health, education, security, equity, the quality of leisure time, or the happiness of the population. Therefore, the document concludes that GDP, while still an important economic tool, **cannot be considered a complete measure of human development** , and that it is urgent to complement it with other more comprehensive and multidimensional indicators that realistically reflect people's well-being and quality of life.

9.3. GDP per capita, nominal and real, PPP (April 4 class) PPTX file

The document offers an overview of the different ways to measure Gross Domestic Product (GDP) and how these measurements can be used more accurately to analyze the economy of a country or region. Three key concepts are highlighted: GDP per capita, nominal and real GDP, and GDP at purchasing power parity (PPP). **GDP per** capita is presented as a useful tool for measuring average income per person, although its usefulness is limited in societies with high inequality, as it does not accurately reflect the standard of living of the majority**. Nominal GDP,** on the other hand, measures the monetary value of production at current prices, but it is misleading when there is inflation, as it may reflect price increases and not necessarily real growth. To correct for this, **real GDP** is introduced , which adjusts values using constant prices from a base year, allowing for a more accurate comparison of economic growth over time. Finally, the document explains **GDP at purchasing power parity** (PPP), which adjusts nominal GDP according to the cost of living in each country, making international comparisons fairer. It even mentions the use of tools like the Big Mac Index to illustrate price differences between countries. Furthermore, it emphasizes that, while GDP is a useful tool, it should not be the only indicator considered . Therefore, it proposes complementing its analysis with other indices such as the **Human Development Index** (HDI), which integrates factors like health, education, and quality of life. Overall, the document encourages a more critical and nuanced use of GDP, acknowledging its contributions but also its limitations, and promoting a broader vision of economic and human development.

9.4. Definition and measurement of unemployment (class of April 4) PPTX file

This document provides an overview of how unemployment is defined, measured, and analyzed in Spain, focusing primarily on the **Labour Force Survey** (EPA), conducted by the National Statistics Institute (INE). This continuous, quarterly survey investigates the behavior of the labour market in terms of employment, unemployment, and inactivity in a representative sample of households. Key concepts are explained in detail: **the active population** (people available for work), **the employed** , **the unemployed** (those without a job but actively seeking one), and the **inactive population** . The methodology used, consistent with international standards such as those of the International Labour Organization (ILO) and the European Labour Force Survey, is also addressed. The document clarifies how the definition of "active job seeker" has evolved since 2002, directly impacting official unemployment figures. Furthermore, essential indicators such as **unemployment, activity, employment, and temporary employment rates are explained** , and the importance of the EPA compared to other sources such as the State Public Employment Service (SEPE) or Social Security are highlighted, explaining the differences between them. Finally, it delves into broader aspects such as structural unemployment, underemployment, the underground economy, the impact of economic cycles and inequalities by gender or ethnicity, highlighting that the unemployment rate, although useful, does not always accurately reflect the reality of the labor market.

9.5. Measuring the cost of living and inflation. (Optional; not included in the exam) PPTX file

The document addresses what **inflation is** , its causes, how it is measured, and its implications. It explains that inflation represents the generalized and sustained increase in the prices of goods and services, and can be caused by factors such as an increase

in the money supply, rising costs, or demand-pull inflation. Historical examples of inflation are presented, such as in the Roman Empire and the French Revolution, as well as contemporary cases like Argentina. The need to measure inflation through **price indices** , such as the **Consumer Price Index** (CPI), which is calculated using a representative basket of goods and services, is introduced. The document details how to calculate the **inflation rate** from this basket and mentions different types of indices (Laspeyres, Paasche, Fisher, among others), as well as other indicators such as the GDP deflator and sectoral indices. The document also describes the statistical methodologies of the CPI, its connection to surveys such as the Household Budget Survey (HBS), its recent methodological changes, and its limitations (such as the difficulty in capturing new technologies or changes in consumption patterns). Finally, the influence of the CPI on multiple economic aspects such as wages, rents, taxes and economic policies is highlighted, and **resources and links to official databases** for economic and statistical analysis at the national and international levels are provided .

- **Topic 10: Economic cycles and the long-term economy.**

10.1. Growth (April 11th class) PPTX File

The document focuses on explaining the dynamics of economic and biological growth, distinguishing between two fundamental types of behavior: **exponential growth** and **logistic growth** . Exponential growth describes how a magnitude (such as production or population) grows proportionally to its current size, following the formula

$x_{t+1} = k\, x_t$

where k is the growth factor (1 plus the growth rate). This type of growth is sustained indefinitely only in environments with unlimited resources, as exemplified by the case of bacteria that double every so often. Useful formulas are shown, such as the one that approximates the time needed to double a quantity as a function of its growth rate: years to double ≈ 70 / growth rate. A relevant example is compound interest, which follows the logic of exponential growth. However, it is noted that no real-world environment possesses unlimited resources, so in the long run, growth encounters limits. This is where **logistic behavior arises** , which incorporates a limiting constant. This model reflects how growth slows and stabilizes as it approaches the limit imposed by the environment. Carrying capacity represents this steady state. The "magnificent dynamics" of classical economists are studied, along with the tendency they asserted toward a steady state. Furthermore, it is argued that capitalism has avoided this stationary state thanks to **technological advancement** , both “intensive” (improving internal processes, increasing k) and “extensive” (expansion of available resources). Finally, it is analyzed that growth requires energy and materials from the environment and that without technological innovation, every system is destined to reach its growth limit, ending in a stationary state. Thus, sustained growth depends fundamentally on overcoming natural limits through technology.

10.2. Investment, consumption and growth (Optional; not included in the exam) PPTX file

The document analyzes the **role of investment** in economic growth, examining the traditional idea that a higher investment rate leads to higher economic growth, given that investment is the portion of production dedicated to generating more output, while

consumption is the portion allocated for immediate use. Two models are presented—an exponential model and a logistic model—to test this idea. In the **exponential model** , Increasing the investment rate effectively increases economic growth and, in the long run, also consumption, provided that investment does not reach 100% of production. This model assumes an environment without limits, where the "common sense" notion that sacrificing present consumption increases future well-being holds true. However, the **logistic model** , which better represents the reality of a planet with limited resources, shows that increasing the investment rate does not generate indefinite growth. On the contrary, more investment can lead to the system colliding more quickly and forcefully with environmental limits, causing a reduction in consumption in both the short and long term. In this context, an excessively high investment rate can be counterproductive, as it does not significantly increase production but does decrease present and future consumption. Nevertheless, an important nuance is introduced: while this logic does not hold true for the planet as a whole, a relatively small economy (such as a country, region, or company) competing for global resources can benefit from a higher investment rate, growing at the expense of others. This creates a contradiction between the individual interests of each economy and global collective well-being, exemplifying what is known as **the fallacy of composition** . Thus, although *at a global level a lower investment rate could increase consumption without significantly affecting growth, individual incentives lead each economy to invest more* , even if this harms the whole. It is concluded that **the true engine of growth is technological advancement** , not simply increased investment, and the need to rethink our economic strategies from a systemic and global perspective is raised.

10.3. Demographics (Optional; not included in the exam) PPTX File

The document focuses on the **dynamics of human populations** through mathematical models and visual representations such as population pyramids. It explains that, to accurately analyze demographic evolution, the population is broken down by age groups, with women being the primary focus, as they are biologically responsible for reproduction. In this model, the number of future births is calculated by multiplying the current number of women in each age group by its corresponding reproduction rate, while the evolution of the rest of the pyramid depends on survival rates across age groups. It highlights that with constant reproduction and survival rates, the population tends toward a stable structure, which can be increasing, decreasing, or constant, depending on whether the growth factor is greater than, less than, or equal to 1. For example, an annual growth rate of 0.92% implies that the analyzed population would double every 75 years, while a negative rate of -1.2% would lead to a halving every 34 years. Furthermore, the concept of **reproductive value** is introduced , which measures the potential to contribute to future generations from the present, and whose theoretical importance is even linked to natural selection. The use of **Leslie matrices** as a formal tool for modeling these dynamics is also mentioned. At an empirical level, **real population pyramids** from countries such as Spain, Germany, the USSR, and China are examined, reflecting the impacts of wars, policies, and social transitions on their population structure. Finally, the importance of **critically analyzing demographic data is emphasized** , considering cases in which censuses have been manipulated or have generated conflicts, as occurred in the USSR. Taken together, this topic shows how population growth and structure depend not only on biological factors but also on historical, social, and political ones, and how their rigorous analysis is key to understanding the economic and social trajectories of countries.

10.3.1. Population Dynamics in One Step [Excel] (Optional; not included in the exam) XLSX File

The spreadsheet presents a **simple population growth model** that analyzes population dynamics using **constant birth and death rates** applied **at a single point in time** . The file includes a table with basic data such as the initial population, birth rates, death rates, and the formulas needed to calculate the net population change over a given period. This approach allows for a clear and direct observation of how these rates affect population growth or decline, serving as an introduction to fundamental population dynamics concepts.

10.3.2. Population Dynamics with Variable Rates [Excel] (Optional; not included in the exam) XLSX file

The spreadsheet presents a **detailed population evolution model** that considers **varying birth and death rates, as well as population additions and subtractions** over **several time periods** . The model allows users to observe how the population changes over time according to these rates, which are not constant but adjust based on time or population size. The document includes simulations that allow for comparing scenarios with different combinations of rates, demonstrating how even small variations can generate significant impacts on long-term population dynamics. Furthermore, it incorporates graphs that visualize population evolution under different assumptions, facilitating the interpretation of results and critical analysis of the model's behavior.

10.4. Economic Growth; A Modern Idea (April 11th Class) PPTX File

The document argues that sustained economic growth, as we know it today—that is, the steady increase in real GDP per capita—has not been a permanent feature of human history, but rather a profoundly recent phenomenon that originated with the **Industrial Revolution** . For millennia, the world economy remained in a state of near-total stagnation: any technological advances or productivity improvements were absorbed by population growth, preventing real improvements in the quality of life, a situation known as the **Malthusian trap** . The technological and industrial revolution of the 18th and 19th centuries broke this pattern, making it possible for production to grow at a faster rate than the population. However, living conditions did not improve immediately: indicators such as **life expectancy** only began to increase significantly toward the end of the 19th century, when social struggles, advances in medicine, urban planning, and public policy began to accompany economic growth. The document illustrates this process using historical data showing how, between the years 1 and 1700, the economy only multiplied by 3.5 (with annual growth rates of 0.07%), while between 1700 and 2021 it grew by 184 (with rates 22 times higher). It also highlights that this modern growth has not only been more intense but has also been cumulative and transformative, affecting both production and the material conditions of existence. Thus, the text concludes that sustained economic growth is not a natural constant of human development but a modern construct, dependent on **technological advancements** , which industrial capitalism leveraged, and on certain specific social and historical conditions that made it possible.

10.5. Economic Cycles I (class of April 25) PPTX File

This document introduces the phenomenon of economic cycles, showing how they have evolved from **sporadic crises in antiquity** to become recurring patterns inherent in

the functioning of modern economies. In the past, crises were caused by external factors such as wars, crop failures, or epidemics, and did not follow a regular pattern. However, from the 19th century onward , with the consolidation of industrial capitalism**, periodic cycles of boom and bust** —known as the modern economic cycle— began to be identified, characterized by their regularity and simultaneous global reach. The text distinguishes between different types of cycles (Kitchin , Juglar, Kuznets, Kondratiev) according to their duration and origin, and reviews various theories, both exogenous (such as those related to credit or astronomical phenomena) and endogenous (such as those of Marx, Keynes, or Schumpeter), each with a particular perspective on the cause and nature of the cycle. Parallels are also drawn **with cycles in other complex systems** , such as the regulatory mechanisms of Watt engines, thermostats, variable stars like Cepheid variables, and animal populations like lemmings and hares, suggesting that cyclical oscillation may be a common property of dynamic systems with **feedback** . Finally, it is emphasized that there is no single theoretical consensus on why economic cycles occur, but there is general agreement that they are a structural part of the capitalist system, which encourages further exploration of their logic from different historical, theoretical, and empirical perspectives.

10.6. Economic Cycles II (class of April 25) PPTX File

The document delves into the theoretical and dynamic explanation of the capitalist economic cycle from a structural and systemic perspective, proposing that cycles are not anomalies, but rather an inherent result of the functioning of allocation mechanisms in decentralized economies like capitalism. In this system, production decisions are made in an atomized manner by independently operating firms, based on expectations about an uncertain future, which generates a high probability of systematic errors in resource allocation. Furthermore, the structural drive toward **profit maximization** pushes the economy toward constant growth, which, combined with the ecological and material limits of the environment, produces recurring oscillations. The document compares these mechanisms to **mathematical algorithms** and shows how both can be unstable and generate cyclical or even chaotic dynamics. It introduces the key concept of **negative feedback** as a regulatory mechanism for many natural and artificial systems (such as Watt's regulator, thermostats, or animal populations), and proposes that the capitalist system behaves similarly: it responds to overproduction or shortages with adjustments in prices and production, but if the intensity of these responses is very high, **boom-bust cycles are generated** . The paper uses the **cobweb model** to illustrate how producers' expectations, relative to past prices, can generate persistent and even divergent oscillations in production and price levels, depending on the sensitivity of economic agents. It also introduces a **simplified logistic model** , where the investment rate, technological intensity, and environmental constraints determine whether the system tends toward a stable equilibrium, a cycle, or chaos. Through this model, the different historical phases of capitalism are explained: a stable stage before the Industrial Revolution; a cyclical stage during the 19th century; a relatively stable phase during the postwar period thanks to the welfare state and government spending; and a return to the cycles since 1973 due to the continuous advance of intensive technology. It is concluded that if the pressure of economic growth on ecological limits is too intense, the system inevitably enters a cycle of crisis and recovery. However, it is suggested that **a possible solution would be to reduce the investment rate** , which would smooth out the fluctuations, buy time to transition to a new development model,

and revive classic proposals such as those of John Stuart Mill, which advocated for a steady state with greater scope for well-being and consumption.

- **Topic 6. Non-competitive markets and public policies. (Optional; not included in the exam)**
- **Topics 7 and 8. Market failures and public intervention. Equity, inequality and poverty. Income redistribution.**

7-8.1. Market and new alternatives (class of May 16) PPTX file

The document presents a reflection on the extremely difficult economic problem of how to allocate resources. It argues that **the capitalist market acts as a real-world algorithm** to solve this problem, breaking it down into sub-problems (firms) and coordinating them through prices, thus allowing for adjustments in production and consumption based on scarcity or abundance. Although no alternative mechanism as effective as the market is known for solving the economic problem, this mechanism tends to evolve into a system where profit is maximized above all else, subordinating human beings and their needs, and generating a dehumanized economy. It also entails other serious **structural problems** such as *inequality, cyclical crises, inefficiency, excessive monopoly power, and a lack of response to global problems* like climate change. The failure of communism and the limitations of the welfare state are analyzed; while the welfare state mitigates certain problems, it perpetuates others and suffers from inefficiency and a lack of global sustainability. The possibility of socialism is also analyzed, with the argument that if it uses the market as a coordinating mechanism without modifying its underlying values, it will inevitably reproduce the same problems as capitalism. Therefore, *the essence of capitalism is not the existence of capitalists, but rather the division of resources into units and their coordination through exchanges, which leads to profit maximization* . Finally, the conclusion is that, while the market is indispensable today, new alternatives are urgently needed to allow for efficient allocation without falling into dehumanization or the structural flaws of the capitalist system.

7-8.2. Problems of Capitalism. Introduction (class of May 16) PPTX File

The document offers a critical yet nuanced view of the capitalist system, acknowledging that, despite its remarkable capacity to allocate resources in complex economies through a mechanism that functions as a “real algorithm,” it presents a series of **structural problems** that directly affect human well-being. Although capitalism adheres to a certain rationality and has proven to be more functional than many alternatives, its *logic focuses exclusively on profit maximization, subordinating attention to human needs.* Capitalism tends to reduce human beings to mere inputs of production, valued like other inputs, and interchangeable with machines or artificial intelligence, leading to a dehumanizing logic. Among its main structural flaws are also: *a lack of consideration for global objectives (such as climate change), inefficiency (such as imbalances or unemployment), instability (cyclical crises), the tendency toward increasing inequality, and the concentration of economic power in monopolies or oligopolies* . It also promotes a culture of individualistic competition that can generate alienation. The document distinguishes between market failures (such as imperfect competition or externalities) and the deeper problems of capitalism, emphasizing that even under ideal conditions of perfect competition, the system still fails to prioritize the satisfaction of human needs. Therefore, although capitalism functions technically, its rationality is

not necessarily compatible with a humanist vision of social development, and some of its problems, if left unaddressed, threaten its very future sustainability.

7-8.3. Lack of attention to global objectives (May 16th class) PPTX file

The document analyzes how the internal logic of capitalism, based on the division of resources among units (firms) that compete to maximize their own profits, prevents the achievement of collective or global objectives; not only addressing human needs but even maximizing overall profit. This dynamic generates a disconnect between maximizing individual profits (**Nash equilibrium**) and maximizing overall profit (**global optimum**), causing rational actions at the firm level to have destructive systemic effects. These tensions are illustrated using concepts from game theory, such as the **prisoner's dilemma** , where the rational option for each agent (such as polluting to reduce costs) leads to a suboptimal outcome for everyone (a polluted environment). Furthermore, the idea that market equilibrium or **Pareto optimum** are ethically desirable states is criticized, as they can exclude those who cannot participate in the market (such as people without property or the ability to work). The text also addresses concepts such as externalities, overinvestment, and the conflict between local economic growth and global sustainability, emphasizing that these problems are not simply due to a lack of regulation or property rights, but rather to a structural logic that fragments decision-making and prioritizes partial objectives over the interests of the whole. Thus, the text concludes that the very design of the capitalist system prevents local decisions from leading to the common good, and that resolving these conflicts requires a profound change in how economic activity is structured and coordinated.

7-8.4. Inequality, between people and between countries (class of May 16) PPTX File

The document analyzes **inequality** as one of the most significant structural problems of capitalism, emphasizing both internal inequality within countries and inequality between nations. It argues that this inequality is not an accident or an anomaly of the system, but rather an inherent consequence of its operating logic: capitalism, even under conditions close to perfect competition and starting from an initial state of equality, tends to generate and amplify economic differences. One of the most widely used tools for measuring this inequality is the **Gini coefficient** , an index that ranges from 0 (perfect equality) to 1 (total inequality), based on the **Lorenz Curve** , which compares the cumulative distribution of income to a perfectly equal distribution. A high Gini coefficient indicates a strong concentration of wealth in the hands of a few, while a low Gini coefficient reflects a more equitable distribution. According to this index, regions such as Europe and Japan exhibit relatively low levels of inequality, while Latin America, Africa, and the United States show higher values. In empirical terms, the data is striking: the richest 10% of the planet holds 75% of global wealth, while the poorest half possesses barely 2%. Globally, this gap is reflected in **Gross Domestic Product (GDP) per capita** , which reveals enormous differences between rich and poor countries. For example, even adjusting for purchasing power parity (PPP), Luxembourg can be more than 170 times richer than Burundi. The report concludes that these inequalities not only persist but tend to widen if effective redistributive policies are not implemented. Thus, the Gini coefficient is not only a quantitative tool but also a wake-up call about the need to reform the economic system so that the benefits of development are not concentrated but distributed more equitably among people and nations.

7-8.5. Dehumanization (May 23 class) PPTX File

The document offers a structural critique of capitalism, focusing on its tendency toward dehumanization as a consequence of its profit-maximization logic. This critique is developed through the distinction between two theoretical models: PM1 and PM2. **PM1, associated with General Equilibrium Theory** and studied by economists such as **Arrow and Debreu** , describes a system in which economic agents maximize their individual utility and prices efficiently coordinate their decisions, orienting the economy toward human well-being. In this approach, producers are subordinate to the desires of consumers, and the system seeks Pareto efficiency . In contrast, **PM2, linked to the reproduction school** and analyzed by models such as those of **Leontief , Von Neumann, and Sraffa ,** represents an environment where all agents maximize only profit, leading to a logic of capital reproduction without reference to human well-being. This view describes a system that reproduces itself without the need for consumers as an end in itself, prioritizing profitability above all other objectives. The text argues that, in a competitive environment, **PM1 tends to evolve into PM2** , as those who maximize profit displace those who pursue other goals. Thus, real-world capitalism is moving closer to the PM2 model, where human beings are reduced to just another input in the production process. This shift implies a profound dehumanization, as the economy ceases to respond to needs and focuses instead on production for production's sake. The document also addresses the psychological impact of this logic, noting how constant competition fosters selfishness and erodes solidarity, as Albert Einstein warned. The figure of the "productivist Robinson Crusoe" illustrates this absurd dynamic: even in isolation, the individual is governed by a logic of profit maximization rather than attending to their real needs. Although institutions like the welfare state have partially humanized the system, their potential disappearance would once again reveal the dehumanized face of capitalism. In short, the problem is not only that capitalism fails to achieve its goals, but that its very goals—profit maximization—lack human meaning.

7-8.6. Dehumanization. Mechanization and Artificial Intelligence (May 23 class) PPTX File

The document offers a journey through the transformations that human labor has undergone throughout history due to the progressive introduction of automated technologies, from the first mechanical looms to current artificial intelligence. It begins by alluding to Aristotle and the Luddite movement , with its rejection of machines that replaced manual labor. Thinkers such as **Sismondi** , who warned of the negative social effects of mechanization, and David **Ricardo** , who revised his position on the impact of machines on workers, are cited. Karl **Marx** 's critiques of capital and the dehumanization of labor under industrial capitalism are also incorporated. The document delves into economic theories that attempted to model the impact of mechanization, such as the **Tugan - Baranowsky** reproduction models. or the pricing equations of **Leontief** and **Sraffa** envision a fully automated economy where human beings are dispensable. In this context, they argue that capitalist systems could continue operating without human workers or consumers, since prices do not reflect human needs but rather the system's structural relationships. This radical hypothesis illustrates a possible culmination of the dehumanization process: the *complete decoupling of the economy from humanity* . The paper analyzes the development of computing and artificial intelligence, highlighting the pioneering contributions of Alan **Turing** , with his universal machine and his question about the capacity of machines to think, as well as John **von Neumann** 's theoretical advances on self-replicating

automata , which anticipated key concepts in artificial intelligence and artificial life . Finally, the paper explores contemporary artificial intelligence, from Deep Blue's achievements against Kasparov to advanced models like ChatGPT , emphasizing its disruptive potential. Studies are cited that warn of the potential elimination of hundreds of millions of jobs, as well as statements from experts like Geoffrey Hinton, who suggests that machines could even develop emotions or pose an existential risk to humanity. As a final reflection, the document presents the notion of an "automated economy," in which humans cease to be the center of the production system, comparing their potential obsolescence to that of horses after the advent of the tractor. It questions the fate of humanity in a world where capital can operate completely independently of it.

7-8.7. The Welfare State (Class of May 23) PPTX File

The document offers an analysis of the historical evolution, foundations, achievements, and challenges of the welfare state as a form of social organization in advanced capitalist economies. It emerged as a response to the unfettered capitalism of the 19th century, a result of the combination of technological development (which increased productive capacity) and social struggles demanding a more equitable distribution of wealth. Throughout the text, key historical antecedents are examined, such as the Poor Laws, religious ideas of charity, and 19th-century social reforms, and the key models are presented: **Bismarck** 's redistributive model and **Beveridge** 's welfare model . The welfare state is structured on four essential pillars: **healthcare, pensions, education, and social services** , and has made a decisive contribution to reducing inequality, improving quality of life, and strengthening social cohesion. However, the document also warns that this model has serious limitations. Only one- *eighth of the* world's population lives under a welfare state, while the rest face harsher forms of capitalism. Furthermore, the report analyzes internal problems such as *bureaucracy, administrative inefficiency, labor market fragmentation, and the demographic challenge* of an aging population. It also addresses external pressures such as *globalization, international competition, and high tax costs* , which could render this model unsustainable without reform. As an example of successful transformation, the report mentions the “new Swedish model,” which integrates public responsibility with freedom of choice and private sector participation. In its conclusion, the document offers a reflection on the future: while capitalism tends to evolve toward extreme forms of productivism, humanity has the capacity to correct this trend through profound reforms. These reforms must extend welfare beyond the developed world, balance market forces and equity, and prevent the profit motive from completely displacing social justice. The welfare state, although imperfect, represents one of the greatest modern civilizational achievements to date, and its defense and adaptation are key to preventing a relapse into a dehumanized capitalism.

7-8.8. State Revenue (Optional; not included in the exam) PPTX File

The document presents a comprehensive analysis of Spanish state revenue, highlighting both its structure and recent evolution. It addresses the different types of taxes that comprise public revenue: direct taxes such as personal income tax (IRPF), corporate income tax, and other taxes on income and wealth; indirect taxes such as VAT and excise taxes (alcohol, hydrocarbons, tobacco); and social security contributions. It also details regional financing mechanisms, including taxes that have

been fully or partially transferred to the regional governments and the guarantee and sufficiency funds. The document compares VAT rates in Spain with those of other European and Latin American countries, showing Spain's position in terms of tax burden. Furthermore, it explains the personal income tax settlement process, breaking down general and savings income, reductions, deductions, and the applicable state and regional tax brackets. Finally, updated information to 2023 is included on the distribution of public income and spending by the State and Social Security, providing links to official fiscal transparency platforms.

7-8.9. Public Spending (Optional; not included in the exam) PPTX File

Public spending in Spain is a fundamental tool of the State for guaranteeing social welfare, financing essential services such as healthcare, education, pensions, security, and infrastructure. In 2023, the spending structure reflects a distribution geared towards sustaining the Welfare State: 47.12% is allocated to social spending, notably €122,052 million for contributory pensions, with an average retirement pension of €1,248.36 per month. Public healthcare, used almost exclusively by 84.5% of the population, includes high hospital costs, such as €3,283 per day in intensive care. In education, over 67% of non-university students and over 72% of teachers work in the public sector, with the average cost per school place being around €100,000 over an individual's educational lifetime. Infrastructure also represents a significant expense: 1 km of high-speed rail costs an average of €16.35 million. Furthermore, Spain allocates a relatively low percentage of its GNI (0.24%) to international cooperation, far from the 0.7% target set by the UN. Overall, the general budget for 2022 totaled more than €527 billion, also including allocations for culture, defense, justice, and economic development. This dataset demonstrates the State's financial commitment to maintaining a comprehensive and redistributive public system.

- **Topic 11. Three centuries, three failures (Optional; not included in the exam)**

11.1. Three centuries, three failures (Optional; not included in the exam) PPTX file

The presentation critically analyzes the predominant socioeconomic systems of the last three centuries, highlighting their limitations and failures. **In the 19th century, "savage capitalism"** achieved significant economic growth, but it generated unemployment, crises, inequality, and dehumanization, leading to its rejection due to its social impact rather than its economic inefficiency. **In the 20th century, "real socialism"** also failed: war communism and Mao's policies were economically unviable, the five-year plans proved inefficient, and experiences like Yugoslavia and the Prague Spring, while promising, did not prosper for political or structural reasons. **In the 21st century, the "welfare state"** is being questioned, since although it has demonstrated that it is possible to reform capitalism to achieve more humane societies, it faces serious threats: its limited scope, demographic problems, internal inefficiencies, and global competitive pressure. The sustainability of the welfare state depends on its global expansion or the maintenance of technological advantages in advanced countries; otherwise, it could become the third major failure.

11.2. Savage Capitalism (Optional; not included in the exam) PPTX File

The document offers a reflection on the real effects of capitalism in its purest form, using **early 19th-century England** during the Industrial Revolution as a case study. Although this period experienced **remarkable economic growth** —with real GDP

increasing thirteenfold between 1750 and 1900 and GDP per capita more than doubling—the analysis demonstrates that **this growth did not translate into a substantial improvement in the quality of life** for the majority of the population. On the contrary, real wages fell until the mid-19th century, life expectancy in industrial cities was 10 to 19 years lower than in rural areas, average male height decreased, infant mortality was extremely high, and working hours reached extreme levels, exceeding 3,400 hours per year. The text argues that "pure capitalism," that is, a system focused exclusively on profit maximization without social constraints, is not designed to improve people's living conditions. It only satisfies human needs insofar as they are useful to the production system. As Sismondi points out , if people could be profitably replaced by machines or animals, capitalism would do so without hesitation, as happened when tractors replaced horses. This leads to the conclusion that *economic growth alone does not guarantee an improvement in social well-being* ; an institutional framework—such as the welfare state, labor laws, unions, and political struggles—is necessary to force the system to distribute some of the wealth generated. The document also warns against a common misconception that economic growth is synonymous with human progress. While there has been a correlation between the two in the last century, this is because institutions have been implemented to moderate the harshest effects of capitalism. If these institutions were to disappear, the economic system would tend to revert to its purest and most ruthless form, prioritizing profit over well-being. The text concludes that the advances in quality of life we enjoy today in advanced societies are not a natural consequence of capitalism, but rather the result of having "tweaked" it through social and political struggle. And it warns that, in many regions of the world, current capitalism still resembles the brutal model of 1800s England, showing that this danger remains present globally.

11.3. Utopian, Scientific, and Real Socialism (Optional; not included in the exam) PPTX File

The document offers a critical overview of the main currents of socialist thought that emerged in response to the problems generated by industrial capitalism, highlighting three major branches: utopian, scientific, and real socialism. **Utopian socialism** , championed by thinkers such as **Saint- Simon , Fourier, and Owen** , proposed the creation of cooperative and egalitarian societies where private property and exploitation would be abolished. However, although their ideas were groundbreaking, their approach lacked a deep analysis of economic dynamics and a viable political strategy, making it more of a moral inspiration than a concrete structural alternative . **Anarchism** , for its part, questioned the legitimacy of any form of government or centralized authority, advocating for a society based on free cooperation among individuals and communities, without state intervention. Thinkers such as **Bakunin and Kropotkin** defended the abolition of both private property and the state, considering state power inherently coercive and an obstacle to true freedom and social equality. In contrast to these perspectives, the **scientific socialism** of **Marx and Engels** presented a materialist interpretation of history, in which class struggle is considered the main driving force of social change. According to this school of thought, capitalism would inevitably be overcome by a proletarian revolution that would abolish private ownership of the means of production and establish a transitional phase toward a classless and stateless communist society, although its workings were not precisely defined.

These ideas inspired the Russian Revolution of 1917 and the creation of **real socialism** , whose main exponent was the **Soviet Union** . In the early years of the Soviet regime, during the Civil War, **Lenin** implemented **War Communism** , which, interpreting Marx's somewhat imprecise ideas in a very particular way, involved a failed attempt at *radical economic planning and the suppression of the market.* This measure, although it helped sustain the new regime, caused famines and strong social resistance. In 1921, Lenin introduced the New Economic Policy (**NEP**), which he described as *state capitalism* , that allowed for some restoration of the market and private property, stabilizing the economy without relinquishing state control over key areas. After Lenin's death, **Stalin** abandoned the New Economic Policy (NEP) and, from 1928, implemented the **Five-Year Plans** , an *administrative economy* with state-controlled prices and production and consumption quotas. These plans spurred rapid industrialization, forcibly collectivized agriculture, and established an authoritarian regime based on ideological control, political terror, massacres, and a massive bureaucracy. Although the USSR became an industrial and military power, society suffered severe repression, and the economy became rigid, with drastic limitations on individual freedoms. This model was replicated in Eastern Europe after World War II, with communist regimes backed by Moscow. In Asia, **China** followed a similar path after the 1949 Revolution, under the leadership of **Mao Zedong** , who implemented campaigns such as the Great Leap Forward and the Cultural Revolution, which led to economic crises, ideological persecution, and millions of deaths. On the other hand, **Yugoslavia** developed an autonomous model of self-managed socialism under **Tito** , which promoted cooperatives and worker management of enterprises, along with limited economic liberalization and political decentralization. After Stalin's death in 1953, **Nikita Khrushchev** initiated a process of **de-Stalinization** , denouncing the crimes of the previous regime and promoting limited reforms with improvements in the quality of life, although without changing the authoritarian nature of the system. In 1968, the **Prague Spring** attempted to introduce " *socialism with a human face* " in Czechoslovakia, but it was crushed by the Soviet invasion, demonstrating the limitations imposed by Moscow on any attempt at internal renewal. In the late 1970s, **Deng Xiaoping** implemented economic reforms in China that opened the country to the global market, promoting agricultural liberalization and the creation of Special Economic Zones, which accelerated its growth. Although the economic model adopted capitalist characteristics, the Communist Party maintained strict political control, which continues to this day. In the 1980s, **Mikhail Gorbachev** attempted to reform the USSR through **Perestroika** (economic restructuring) and Glasnost (political opening), trying to incorporate market elements, but these reforms further destabilized the regime, contributing to the disintegration of the socialist bloc and, ultimately, to the dissolution of the USSR in 1991. Finally, socialist structures embedded within capitalism, such as cooperatives and kibbutzim, are analyzed.

The document concludes by highlighting that, although socialism has historically sought to overcome the inequalities of capitalism, its various manifestations—utopian, scientific, and existing socialism—present significant contrasts. Marx's ideas, for example, differed greatly from Lenin's radical planning and the administrative economy of Stalin and his successors. While progress was made in areas such as industrialization and education, serious contradictions also emerged, such as authoritarianism, repression, and bureaucratization, which distanced these regimes from the emancipatory ideals that initially inspired them.

11.4. Socialism and Economic Calculation (Optional; not included in the exam) PPTX File

The document addresses the historical and complex debate on the possibility of a rational allocation of resources in a socialist economy, focusing on the so-called " **problem of economic calculation** ." It traces the full arc of the debate from its roots in Ricardian socialism, through **Marx** and **Engels** ' critique of labor values as the basis of a post-capitalist economy , to Ludwig von **Mises** , who in 1920 argued that without private ownership of the means of production and without a market, it is impossible to rationally allocate resources because there would be no prices reflecting the marginal utility of capital goods. This critique was expanded upon by **Hayek** , who introduced the problem of the dispersion of knowledge and the impossibility of a central authority effectively coordinating the necessary information. However, various authors responded to this objection: Oskar **Lange** proposed a socialism with parametric prices determined by trial and error, where a planning board would simulate the market; **Kantorovich** and **Dantzig** developed theories of optimal allocation using mathematical programming, with values defined as Lagrange multipliers; and it was argued that economic value can exist even without a market, as shown by the Robinson Crusoe economy or population growth simulations. Throughout this document, it becomes clear that *the real problem with socialism is not logical but practical* : the difficulty of obtaining all the relevant information, solving the necessary systems of equations, and putting the planned allocations into practice. Furthermore, the view that capitalism represents a superior rationality is dismantled, showing that its accounting and allocation methods maximize profit, but not necessarily the fulfillment of human needs. Thus, it is argued that both capitalist and socialist systems can have values and accounting systems, but that in socialism they should be oriented toward a different objective: social well-being, not profit. The text concludes that it is possible to construct economic mechanisms alternative to the market, provided they use different forms of accounting and value, and that a viable socialism, especially in complex contexts, must necessarily decentralize part of the allocation, coordinating its production units through modified economic mechanisms—such as a regulated market—that depart from capitalist logic. Ultimately, the document maintains that socialism is not only logically possible, but can aspire to its own human-oriented economic rationality, as long as it moves away from the fetishism of total planning or the mechanical reproduction of the capitalist market.

- **Topic 12. History of Economic Theory (Optional; not included in the exam)**

12.1. Crisis in economic theory (Optional; not included in the exam) PPTX file

The initial section explains how the evolution of the discipline, from the dominance of the classical school (Smith, Ricardo, Mill) in the 19th century, through the neoclassical school (Jevons, Marshall), to general equilibrium (Walras, Arrow, Debreu), has left unresolved gaps, especially in the face of real-world problems such as economic crises, unemployment, and climate change. Although general equilibrium remains the dominant theoretical framework in academia, it has lost credibility and practical relevance, leading to a current scenario of theoretical crisis and a lack of consensus. Public policies are often designed today without a robust theoretical foundation, revealing that economics has not yet reached a mature state as a science. The document organizes the main theories of prices: **classical retrospective objectivism**

(prices as production costs), **neoclassical prospective subjectivism** (prices as marginal utilities), **general equilibrium coordination** (prices as the interaction of agents in the market), **optimization Lagrange multipliers** (prices as marginal rates), and **reproduction interdependence** (prices as conditions for maintaining the system). Furthermore, it emphasizes that these positions, far from being necessarily contradictory, can be understood as **complementary perspectives** on the same multifaceted reality, which can be integrated into a more comprehensive theory, as has occurred in other areas of science with apparent contradictions overcome through synthesis (for example, the wave-particle duality of light or the equivalence of formulations in quantum mechanics). In short, it argues that advancing toward a deeper understanding of capitalism requires combining these different perspectives, overcoming the limitations of each isolated approach.

12.2. Classics I (Optional; not included in the exam) PPTX File

The document on classical economists presents a synthesis of their theoretical contributions, highlighting how their analysis helps us understand both the “pure” capitalism of the past (without a welfare state, labor laws, or social safety nets) and the risks that contemporary capitalism faces if it loses these protections. It explains that classical economists, such as **Adam Smith, David Ricardo, Thomas Malthus, and John Stuart Mill** , offered fundamental tools: from theories of value (labor theory of value, production costs, distribution among wages, profits, and rents) to concepts like the “invisible hand,” comparative advantage, the limits to growth, and the stationary state. Furthermore, it revisits historical and philosophical antecedents, such as *Aristotle, the Scholastics, and the Physiocrats* , who reflected on the just price and the relationship between use value and exchange value. The document underscores that classical economists, despite living in a very different context, offered relevant insights for understanding current dilemmas, such as the impact of automation, the role of capital, distributive tensions between social classes, and the risk that technological progress will increase total production without guaranteeing equitable distribution or improvements in general well-being. It also points out that if modern institutions were to disappear, the logic of capitalism would spontaneously tend to reproduce dehumanized forms of economic organization, where wages would be reduced to the bare minimum and workers could be displaced by machines—a warning that remains relevant today. In short, analyzing classical economics is not only a historical exercise but also a key to critically reflecting on the structural and ethical challenges of contemporary capitalism.

12.3. Classics II (Optional; not included in the exam) PPTX File

The second section on classical economics expands and deepens the analysis, focusing particularly on **Karl Marx** , who reworked and critiqued classical economics. Marx argues that the essence of capitalism lies not in visible prices or a supposed superficial law of costs, but in the hidden process of exploitation of human labor. This process generates surplus value through extended working hours, beyond what is necessary for the reproduction of workers, thus establishing a rate of surplus value that, circulating among capital through competition, takes the apparent form of a uniform rate of profit. The document compares the **different classical schools of thought** , their theories of value, wages, rent, and resources, showing how the initial ideas were later corrected, superseded, or transformed, especially by recognizing theoretical limitations (such as the circularity of the cost of production theory) and empirical errors

(such as the Malthusian mechanism's poor prediction of declining birth rates and rising wages in advanced societies). It also examines the classical notion of the **steady state** , where growth would be limited by resource constraints, and explains how capitalism has historically circumvented this limit thanks to continuous technological advancement, expanding the system's carrying capacity. Finally, it highlights that, although classical economists viewed capitalism as a machine governed by rigid laws (“iron laws”), they did not anticipate the institutional transformations—such as social struggles, labor legislation, and the welfare state—that have partially humanized economic relations. However, it warns that if these institutions were to disappear, the relentless logic of capitalism would resurface, reminding us that social progress is not guaranteed by economic dynamics alone, but depends on political and collective decisions.

12.4. Neoclassics (Optional; not included in the exam) PPTX File

The section on neoclassical economists explains how this school, which emerged in the late 19th century, broke with classical approaches by introducing marginalism, subjective value, and a more precise mathematical formalization of economic analysis. Three main branches are distinguished: the **English school** (with **Jevons and Marshall** , focused on supply and demand), the **Austrian school** (with **Menger, Böhm-Bawerk , Wieser , Mises, and Hayek** , emphasizing methodological individualism, time preference, opportunity cost theory, and a critique of Marx), and the **Lausanne school** (with **Walras, Pareto, and Cassel** , which developed general equilibrium and is discussed in another document). Neoclassical economists shifted the analysis from the past to the future, considering that the value of goods depends on their expected utility, not on historical production costs. This shift allowed them to construct more general theories, avoiding specific explanations for certain factors such as land. However, they are criticized for extrapolating the subjectivism that can be applied to simple models (such as Robinson Crusoe or Wieser 's idealized communism) to the complexity of capitalism, where prices are determined more by profit expectations than by pure subjective utility. The document also points out that the Austrian school was reluctant to adopt mathematical models, unlike other branches. Ultimately, the neoclassical legacy consists of having renewed economic analysis with a prospective, marginalist vision, albeit with significant limitations when it comes to explaining the specific dynamics of real-world capitalism.

12.5. General Equilibrium (Optional; not included in the exam) PPTX File

The section on general equilibrium addresses the evolution of mathematical models that attempt to describe how prices coordinate the actions of consumers and producers in a competitive economy, from the pioneering work of **Léon Walras and Gustav Cassel** to the more refined formulations of **Kenneth Arrow and Gérard Debreu** . These models assume that goods are fully specified in physical, temporal, and geographical terms, and that agents— *producers maximizing profits and consumers maximizing utility* under a budget constraint—operate within a framework where present decisions incorporate *perfect predictions* of the future. General equilibrium is defined as the state in which no one can improve their situation without harming another, and the famous existence and optimality theorems prove that, under certain conditions, there are prices that allow private decisions to be reconciled with available resources. However, the document criticizes the fact that, despite its centrality in economic theory, this model

lacks direct *empirical testing , exhibits internal inconsistencies* , and *fails to explain how equilibrium is actually achieved* in a real economy characterized by cycles, crises, and imbalances. Furthermore, by focusing exclusively on the role of price as the exchange rate, it overlooks key aspects of value highlighted by other schools of thought. In short, the general equilibrium model proves insufficient as an empirical description of real economic functioning and must be complemented by other perspectives to understand phenomena such as crises, unemployment, and persistent imbalances.

12.6. Optimization (Optional; not included in the exam) PPTX File

The section on optimization explores how mathematical tools, especially linear programming developed by **Leonid Kantorovich and George Dantzig** (with their famous simplex algorithm), allow us to formalize the optimal allocation of resources under known constraints. In this approach, **prices are interpreted as Lagrange multipliers** : they represent the rate at which the objective (whether utility, profit, or another goal) increases when an additional unit of a resource is available, extending *the concept of value beyond a simple exchange rate* . Thus, even in non-market contexts, such as Robinson Crusoe's Island, we can speak of the intrinsic value of things in terms of their marginal contribution to an objective. In capitalist economies, this objective is usually profit maximization, leading each firm to solve constrained optimization problems, but in an interdependent manner, since markets connect the decisions of all agents. However, the document criticizes the optimization school for addressing these problems abstractly, without clearly specifying the overall allocation objective or how to dynamically integrate market exchanges into the process—aspects that general equilibrium theory attempted to cover. In short, mathematical optimization provides a powerful framework for understanding economic decisions as a **problem of maximization under constraints** , illuminating the role of prices as indicators of relative scarcity, but it needs to be complemented by models that articulate aggregate behavior and interactions between agents to adequately capture the complexity of real-world capitalism.

12.7. Notes for a synthesis (Optional; not included in the exam) PPTX File

The section on reproduction examines economic theories that understand the economy as a system of circular flows between sectors and classes, starting with precedents such as the Tableau From François Quesnay's economic theory and Karl Marx's reproduction schemes, to **Wassily Leontief** 's modern input-output table studies and the mathematical models of **Piero Sraffa** and **John von Neumann** , these approaches highlight that, unlike neoclassical or general equilibrium views that see the economy as a simple one-way street (from means of production to consumer goods), *capitalism is a non-anthropocentric system* where even humans are inputs replaceable by machines or artificial intelligence, and where what matters is *maintaining the conditions for the process of accumulation and expansion to be repeated indefinitely* . **Input-output analysis describes the interrelationships of an economy**, how the outputs of one sector become inputs for another, while Sraffa's and von Neumann 's models go further by formalizing prices, profit rates, and growth as a result of the technical conditions of production. The document highlights strengths, such as its emphasis on productive interdependencies and the forces that enable mutual expansion, and limitations, such as its failure to fully integrate the link between value and Lagrangian optimization multipliers, nor the role of prices as coordination mechanisms. In short, the

reproduction school provides a key perspective for understanding the circular, expansive, and non-human-welfare-centered dynamics of capitalism, offering powerful models for analyzing systemic sustainability beyond individual consumption.

12.8. Notes for a synthesis (Optional; not included in the exam) PPTX **file**

The final section seeks to integrate the various economic schools into a coherent, non-contradictory theory of value, highlighting that each approach offers a partial but complementary perspective. *From classical economics, it adopts* **objectivism** : prices depend on objective production conditions, though not on costs. *From neoclassical economics, it incorporates* **prospectivism** : prices depend on the expected future, but in capitalism, not on subjective utility, but on anticipated profits. *From general equilibrium, it takes the notion of* **coordination** : prices allow for the reconciliation of decentralized decisions by economic agents, although the category of value is not limited to exchanges. *From optimization, it assumes prices as* **Lagrange multipliers** : they express the marginal value of resources relative to the maximization objective, although the optimization school did not always clarify what the specific objective is (in capitalism, profit). Finally, *from reproduction, it adopts the* **circular, rather than anthropocentric, view** : in capitalism, human beings are just another input, replaceable by machines or AI, and what matters are the flows that allow the system to sustain itself. The document argues that a robust understanding of capitalism requires **integrating these five perspectives** , since value is multifaceted and no single approach is sufficient. This synthesis offers an ambitious framework for understanding real-world economic functioning, combining technical, dynamic, social, and philosophical dimensions into a broader whole.

- **Capital (educational game/activity)**

The activity involves a simulated capitalist system, where students start with a certain quantity of goods, exchange them among themselves, and then choose production processes that utilize the goods they acquired through these exchanges. Once production is complete, they obtain new quantities of goods as products, and the entire process is repeated.

The game is inspired by the one described in Alfons Barceló, “Simulation Games with Reproductive Economic Models”, *El Trimestre Económico* , Vol. 56, No. 223(3) (July-September 1989), pp. 547-569. https://www.jstor.org/stable/23397517

The game consists of obtaining the greatest profit at the end of the semester . At the beginning of the semester, each student will have a certain amount of materials (wheat and iron).

In each class:

1. Each student may give any other student as many of their materials as they wish. They may make up to five deliveries.

2. Each student will be able to choose only one production process:

1) 280 of wheat and 12 of iron are used to produce 575 of wheat, or an equal ratio. 2) 120 of wheat and 8 of iron are used to produce 20 of iron, or an equal ratio. 3) If either of the above processes is not used, the available materials are reduced by half.

In processes 1 and 2, all available materials are consumed, so that after production, only the wheat or iron produced will remain.
If a student intends to deliver larger quantities than are available, they will deliver the available amount, but will be penalized. Contracts can be signed with up to four students; failure to comply will result in severe penalties.