Economics 362, Macroeconomic Theory, Hanes, Spring 2024
PRELIMINARY Outline

I) Introduction **Mankiw Ch. 1**
- A) Macroeconomic Phenomena and Questions
  - 1) Economic growth and development
    - a) Facts
      - i)Output or Income per person across countries
      - ii) Output per person over time - “Great Divergence”
    - b) Questions
      - i) Why are some countries, rich, poor?
      - ii) Why are rich countries more productive now than in 1800?
      - iii) Can we make poor countries rich?
  - 2) Business Cycles
    - a) Facts: recessions and booms
    - b) Questions
      - i) What causes them?
      - ii) How can we avoid recessions?
  - 3) Inflation, Deflation
    - a) Facts
      - i) Varies across countries, and across time
      - ii) People don’t like it
    - b) Questions
      - i) What causes it?
      - ii) How can we control it?
- B) How economists approach these questions
  - 1) Focus on "variables"
  - 2) Take some things as given: "exogenous" versus "endogenous" variables
  - 3) How do changes in exogenous variables affect endogenous variables?
  - 4) Complications
    - a) An exogenous variables may affect many endogenous variables
    - b) Endogenous variables affect other endogenous variables
  - 5) Models
  - 6) Equations and graphs

II) Macroeconomic statistics
- A) Intro
  - 1) Prices and quantities
  - 2) Real versus nominal
  - 3) Statistics we will cover
    - a) Price indexes
    - b) GDP and related statistics
    - c) Employment and unemployment
- B) Price indexes **Mankiw Ch 2 section 2-2**
  - 1) Concepts
    - a) Price level, inflation, deflation
    - b) Price index number
    - c) Inflation rate
    - d) What prices are included?
    - e) Mathematical formulas
  - 2) Working with an index number
    - a) Base year

i) Equal to 1
ii) Equal to 100
iii) Equal to any other number
b) Going from index number to percent changes
c) Going from percent changes to index number
d) Linking index numbers for different spans of years
i) Using percent changes
ii) Using ratios
3) Characteristics we want our price index number to have
a) Weight prices by importance of good, so weight *P*'s by *Q*'s
b) Changes in quantities alone must not affect price index
4) Example: 2 years, 2 goods
a) Intro
b) Using Q's from first year (Laspeyres)
c) Using Q's from second year (Paasche)
d) Geometric average of the two (Fisher ideal)
5) Types of price indexes
a) Laspeyres
b) Paasche
c) Fisher ideal
d) Chain-weighted Fisher ideal
6) Which type is best?
a) Demand curves slope down
b) Quantities from a late year will "understate" inflation (Paasche)
c) Quantities from an early year will "overstate" inflation (Laspeyres)
d) Chained Fisher ideal is best
7) US price indexes
a) CPI
b) PCE price index ("PCE deflator")
c) GDP price index

C) GDP **Mankiw 2-1**
1) Introduction
2) Concepts
a) Output of goods and services
b) Final versus intermediate goods and services
c) Capital (part of final output)
d) Domestic output of final goods and services
e) Depreciation
f) Gross versus net of depreciation
3) Definition of GDP
4) How we measure nominal GDP: value-added
a) Establishment
b) Value-added by an establishment
c) Total VA equals nominal GDP (example)
5) GDP and income of Americans
a) Definition: "factor income," "factor payments" (wages, profits, rents)
b) Review: value-added of an establishment
c) Value-added equals total factor payments (income) paid out by an establishment
d) GNP (or GNI, gross national income)
i) Definition
ii) GNP (GNI) equals total income of Americans

D) Real GDP **Mankiw 2-1**

1) Introduction
2) Characteristics we want our real GDP number to have
    a) Weight quantities by importance of good in sales or expenditure: weight by *P*'s
    b) Changes in prices alone must not affect real GDP number
3) Real GDP index (chain-weighted real GDP index)
    a) Real GDP index (Fisher ideal index of *Q*'s, weighting by *P*'s)
    b) Chained (2012) dollar index
    c) GDP deflator
        i) What it is
        ii) Not same as GDP price index

E) Components of GDP
1) Consumption *C*
2) Investment *I*
3) Government purchases of goods & services *G*
4) Net exports *NX*

F) Unemployment, unemployment rate **Mankiw 2-3**
1) Theoretical concept
2) Statistic: civilian unemployment rate
    a) Monthly survey
    b) Defining people as unemployed
    c) Unemployment rate

III) Capital, Labor and Output **Mankiw Ch. 3-1, 3-2**

A) Intro

B) Factors of production
1) Labor
2) Capital
3) Inputs we're ignoring
    a) Land & other natural resources
    b) Skills of workforce

C) Aggregate production function
1) General definition
2) Constant returns to scale
    a) What we observe across countries
    b) CRS: definition
    c) How to tell if a production function has CRS
        i) Methods ("z method")
        ii) Examples
3) Marginal product
    a) General definition
    b) MP of labor
    c) MP of capital
    d) MP and **calculus**
    e) Diminishing MP
        i) Defn
        ii) In a graph
        iii) Examples

D) Cobb-Douglas Production Function
1) Another characteristic we want: constant shares of income to capital vs labor
    a) Definition: income shares
    b) What NIPAs show
2) How production function is related to factor shares of income: model

a) Simplifying assumptions
i)) Homogenous K & L
ii) Employers maximize profit
iii) All labor, capital and product markets perfectly competitive
b) Real factor prices
c) MP and factor demand
i) General principle
ii) Labor
iii) Capital
d) Division of national income
i) Income and MP's
ii) Zero economic profit and Euler's theorem **(calculus)**
3) Cobb-Douglas production function
a) What it is
b) Has CRS
c) Has diminishing MP's
d) Allows constant income shares
i) Fact from NPIAs
ii) Labor's share of income in Cobb-Douglas
iii) Capital's share of income in Cobb-Douglas
4) What we think aggregate production is
E) Growth accounting **Mankiw 9th & 10th ed. Ch. 9 appendix; 11th ed. Ch. 10-2.**
1) Question
2) A Math trick **(calculus)**
3) Growth Accounting Equation
a) What it is
b) How to get it
i) Fix A
ii) Allow A to grow
4) Apply growth accounting to US
F) Recent development: decline in labor's share of income
1) Fact
2) Possible explanations
a) Change in nature of technological progress
b) Left out of model: imperfect competition

IV) Aggregate Demand and the Real Interest Rate **Mankiw Ch. 3-3, 3-4**
A) Review: "exogenous" versus "endogenous"
B) "Natural rates" of unemployment and output
1) Natural rate of unemployment (or NAIRU) $\overline{u}$
2) Natural rate of output (or potential output) $\overline{Y}$
C) Question: how do you make $Y = \overline{Y}$ (which means $u = \overline{u}$)?
1) Review: components of GDP
2) "Aggregate demand" for goods and services AD= Y
3) Simplification for this section: "closed economy"
4) So how do you make $AD = \overline{Y}$ in a closed economy? Preview of answer
D) Determinants of demand for goods and services
1) Consumption C
a) Variables that affect consumption
i) Household income Y
ii) Taxes

iii) Transfers
iv) Total effect: disposable income Y-T

b) Consumption function
i) In words
ii) In an equation of general form
iii) In a linear equation for a simple example

c) Marginal propensity to consume

2) Investment I

a) Investment projects and I

b) Variables that affect expected profitability of an investment project
i) Interest rate i
ii) Expected future inflation $E\pi$
iii) Total effect: real interest rate $r = i - E\pi$

c) Investment function
i) In words
ii) In an equation of general form
iii) In a linear equation for a simple example

3) Government purchases of goods and services G and taxes net of transfers T

E) How do you make components of demand add up to $\overline{Y}$?

1) Review story so far

2) One value of r makes $Y = \overline{Y}$

a) In equations of general form
b) In linear equations with algebra
c) In a graph: IS curve
d) Changes in $\overline{r}$

F) Supply and Demand for Loanable Funds

1) Introduction
2) Firms borrow from households
3) Who else borrows from households? Government
4) Total borrowing equals households' savings ("private saving")
5) Public saving
6) Investment spending equals "national saving" S

a) S = I
b) In equations of general form
c) In simple linear equations
d) When $Y = \overline{Y}$

7) Loanable funds graph

a) What's on the axes
b) Lines on the graph
i) National savings
ii) Investment
c) Natural rate of interest on the graph
d) Changes in $\overline{r}$ in loanable funds graph

V) Open economy **Mankiw Ch. 6**

A) Introduction and review

1) “Closed” versus “open” economy
2) What we’ll cover
3) A big lesson
4) Review of closed economy

a) Y = C+I+G

b) S=I

B) International trade in goods and services
1) New notation (letters)
2) Y = C+I+G+NX

C) International trade in assets
1) What it is
2) Net capital outflow (NCO) or Net Foreign Investment
3) NCO and National Saving

D) NX and NCO
1) No free stuff
2) NX = NCO = S-I
3) Possible situations
a) Balanced trade
b) Trade surplus
c) Trade deficit

E) Exchange rates
1) Nominal exchange rate
2) Real exchange rate
a) Definition
b) Price levels
c) Real exchange rate and price levels
d) Change in real exchange rate
3) Real exchange rate and NX

F) Model of small open economy with $Y = \bar{Y}$
1) Review: loanable funds
2) Definition of small open economy
a) Perfect capital mobility r = r*
b) Country too small to affect r*
3) Model
a) What model does
b) Model
i) Two graphs
ii) Take r*, get NCO
iii) Take NCO, get real exchange rate
c) Trade surplus, trade deficit, balanced trade
4) Examples of events
a) Tax cut
b) Protectionist trade policies (tariffs or quotas)

VI) Unemployment **Mankiw Ch 7**

A) Introduction
1) Review
2) Puzzle: perfectly competitive labor market, excess supply of labor?
3) Answer: labor market isn't like that
a) Frictional unemployment (job search)
b) Structural unemployment (real wage rigidity)

B) How economists think about equilibrium unemployment: inflows and outflows
1) u, E , L, U
2) Rate of job separation s
3) Rate of job "finding" f
4) Equilibrium

C) Frictional unemployment

1) Definition
2) Government policies
    a) Employment agencies, retraining programs
    b) Unemployment insurance

D) Structural unemployment
1) Definition
2) Minimum wage laws
3) Unions
4) Efficiency wages
    a) What phrase means
    b) Why it could be true
        i) Nutrition
        ii) Turnover
        iii) Effort on the job
        iv) Quality of average employee

VII) Saving, population growth and output **Mankiw 9th Ch. 8; 10th Ch. 8 to p. 231; 11th ed. Ch. 8 plus 9-1 to p. 214**

A) Intro
B) "Per worker" production function
1) What it is
2) In a graph
3) MPK and slope of per-worker production function
    a) What it is
    b) Example: Cobb-Douglas
4) Rich vs. poor country

C) What determines k for a country?
1) Consumption vs. saving
2) Depreciation
3) Change in k per year
4) In a graph
    a) i vs. δk
    b) k growing
    c) k shrinking
    d) k stable
5) What happens to an economy
6) k* depends on s
7) What happens if s changes?
8) Numerical example
    a) Cobb-Douglas production function with $\alpha = 1/2$
    b) Get per-worker production function
    c) Find k*

D) What is best s & k for an economy? Golden Rule.
1) Review
    a) Slope of f(k)
    b) k* (steady-state)
    c) Consumption
2) k* and s can be too low/too high
3) Golden rule k* & s
    a) What it is
    b) Diagnostic: how do you know if economy is at golden rule?
    c) Why is this true?

i) Logic
ii) Calculus
iii) Graph

4) Cobb-Douglas example
5) Golden rule and savings rate
a) Review
b) Another diagnostic
c) Demonstrate that it's true

E) Population growth
1) Intro
2) Population growth rate
3) Break-even investment
4) Graph with pop. growth
5) Golden rule
6) Effect of higher popn. growth

F) Lessons from this section
1) Golden rule
2) What makes countries rich/poor
a) Theory
b) Reality

VIII) Introduction to business cycles **Mankiw 9th & 10th ed. Ch. 10-1; 11th ed. Ch. 11-1**

A) Review: natural rates" of unemployment and output $\overline{u}$, $\overline{Y}$
B) Deviations of u and Y from natural rates
a) Recessions and booms
i) Technical definition
ii) The way we'll use the phrases
b) Okun's Law
C) Inflation and business cycles
D) Preview of the rest of this course
1) Review: relationship between r and Y: "IS curve"
2) Where does r come from? Money supply, money demand and price level
3) Where does price level come from? "Aggregate supply," "Phillips curve"
4 Model of business cycles and inflation
5) "Monetary policy": what the Fed does
6) Why business cycles happen in our economy

IX) The IS curve ("Algebra of IS/LM and AD from old Mankiw edition" posted on my website)

A) Introduction
1) Closed economy
2) Preview: IS curve
B) Review: AD and components of spending
1) Y = C + I + G
2) Government purchases of goods and services, taxes net of transfers
3) Consumption function
4) Investment function
C) Relationship between *r* and *Y*
1) Complication: Y affects C, C affects Y
2) Solving the linear equations
3) What the "spending equation" says
a) Government spending multiplier

b) Tax multiplier
c) Effect of a change in r

D) IS curve
1) What it is
2) Equation of the IS curve
3) Moving along the curve
4) What shifts the curve
a) Fiscal policy
i) Change in G
ii) Change in T
b) Other things

E) Meanwhile, loanable funds
1) Why is it called the IS curve?
2) Using IS curve along with loanable funds graph

F) Summary of model so far

X) Money and determination of the interest rate

A) Money **Mankiw Ch. 4-1**
1) Functions of money
2) Banks and similar institutions
3) Central banks
4) Money supply
a) Definition
b) How money supply is determined by the central bank

B) Money demand **Mankiw 9th & 10th edition Ch 11-2, 12th edition Ch 12-2**
1) Intro
2) Price level P
3) Real income/spending Y
4) Nominal interest rate i
5) Real money balance demand function
a) In an equation of general form
b) In a linear equation for a simple example

C) Determination of i
1) Money supply and demand graph
2) What shifts money demand curve
a) Y
b) Money demand shock
3) What shifts money supply curve
a) M supply
b) P
4) Money supply and demand together
a) Increase in M supply
b) Increase in P
c) Increase in Y

D) How i is determined in an economy
1) Central bank has a target for i
a) When policy committee meets, choose i^T
b) Staff adjusts M^S to make $i = i^T$
2) Central bank does not have a target for i
a) When policy committee meets, choose M^S
b) Complication!

E) The LM curve
1) Intro
2) Converting *i* into *r*
3) Money supply, *r* and *Y*: the LM curve
4) Change in M^S / P shifts the LM curve

F) IS and LM together
1) Determines both r and Y
2) What shifts IS curve
3) What shifts LM curve

G) Options for a central bank
1) Choose a value for r, adjust money supply accordingly
2) Choose a value for the money supply, let IS-LM determine *r* and *Y*
3) Which is better?

XI) Inflation, expected future inflation and the price level

A) Introduction and review
1) Introduction
2) Review
a) Natural rate of unemployment
b) Natural rate of output (or potential output)
c) From Econ 360: price and marginal cost

B) Expectations-augmented Phillips curve
1) General idea
2) In terms of $(u - \bar{u})$
3) In terms of $(Y - \bar{Y})$

C) Expected future inflation $E\pi$
1) Introduction
2) Anchored expectations
a) What it is
b) How inflation behaves under anchored expectations
3) Adaptive expectations
a) What it is
b) How inflation behaves under adaptive expectations
4) Rational expectations

XII) Our economy

A) Introduction

B) What our central bank does
1) Target inflation rate π^T
a) Changes rarely if ever
b) Announced to the public
2) Target interest rate i^T
a) Choose it every meeting
b) Adjust M^S to make $i = i^T$
c) Choose i^T to make $r = r^T$
d) Choose r^T to make $\pi = \pi^T$

C) How to make $\pi = \pi^T$
1) If $E\pi = \pi^T$
2) If $E\pi > \pi^T$
3) $E\pi < \pi^T$

4) Supply shocks

D) Why recessions can happen

1) $E\pi > \pi^T$

2) Fed's estimate of $\overline{r}$ is too high

a) What happens

b) Why is $\overline{r}^E > \overline{r}$?

i) Wrong about position of IS

ii) Wrong about $\overline{Y}$

E) Why inflation can exceed the target

1) Fed's estimate of $\overline{r}$ is too low

2) Supply shock

F) Recent history