Economics 362, Macroeconomic Theory, Hanes, Spring 2022
Revised outline as of February 17

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 **Mankiw Ch. 2**
    A) Intro
        1) Prices and quantities
        2) Real versus nominal
    B) GDP and related ideas
        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
            a) Gross domestic product
            b) Nominal GDP
            c) Real 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) How we measure real GDP
    a) What it's called: "chain-weighted real GDP"
    b) Characteristics we want our real GDP number to have
        i) Weight quantities by prices
        ii) Changes in prices alone must not affect real GDP number
        iii) It's all relative: what matters is percent changes
    c) How to construct percent change from one year to the next
        i) Get prices and quantities in each year
        ii) Use prices in first year
        iii) Use prices in second year
        iv) Average the two answers
    d) "Levels" of real GDP
        i) Graphs
        ii) Index number: definition
        iii) How to make an index number from percent changes
        iv) Real GDP quantity index
        v) Chained (2012) dollar index
6) Components of GDP
    a) Consumption C
    b) Investment I
    c) Government purchases of goods & services G
    d) Net exports NX
7) 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

C) Price indexes
    1) Concepts
        a) Price level
        b) Price index
        c) What goods & services are included
    2) Methods of constructing price indexes
        a) Generally, weight prices by quantities
        b) Laspeyres ("based on a fixed basket of goods")
            i) Choose a base year
            ii) Get $P's$ and $Q's$ in base year
            iii) In later years, just get $P's$
            iv) For each year, calculate total $(P \times Q)$ using quantities ("basket") in base year
            v) Divide each year's total $(P \times Q)$ by base-year total $(P \times Q)$
            vi) Result: index number equal to 1 in base year
            vii) Measure of inflation
            viii) After several years have passed, update base year ("basket")
        c) Paasche ("based on a changing basket of goods")
            i) Every year, get $Q's$ in this year and $P's$ in this year and past years

ii) Each year, calculate total $(P \times Q)$ using quantities ("basket") in current year

iii) Choose base year (could be current year)

iv) Divide each year's total $(P \times Q)$ by base-year total $(P \times Q)$

v) Result: index number equal to 1 in base year

vi) Measure of inflation

vii) More work than Laspeyres

d) Fisher

i) Like chain-weighted real GDP in reverse

ii) Use quantities in first year

iii) Use quantities in second year

iv) Average the two answers

v) Construct index number from percent changes

vi) An average of Paasche and Laspeyres

3) Which method is best? Fisher

a) What causes a price index to "overstate" or "understate' inflation

b) *Why a Paasche index "understates" inflation*

c) *Why a Laspeyres index "overstates" inflation*

4) US price indexes

a) CPI

b) PCE price index ("PCE deflator")

c) GDP price index

D) Unemployment, unemployment rate

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) $\bar{u}$
    2) Natural rate of output (or potential output) $\bar{Y}$
  C) Question: how do you make $Y = \bar{Y}$ (which means $u = \bar{u}$)?
    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 $AD = \bar{Y}$ 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 $\bar{Y}$?

    1) Review story so far

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

        a) In equations of general form

        b) In linear equations with algebra

        c) Natural rate of interest $\bar{r}$

            i) What it is

            ii) What affects it

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 $Y = \bar{Y}$

    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 the natural rate of interest

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i) Review: our equation for $\bar{r}$
ii) Fiscal policy
iii) Changes in investment demand (investment function)
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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
    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) How to find it
        i) Logic
        ii) Calculus
      iii) Graph
4) Cobb-Douglas example
5) Golden rule and savings rate

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 $\bar{u}$, $\bar{Y}$
    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 nominal interest rate
     A) Money **Mankiw Ch. 4-1**
          1) Functions of money
          2) Banks and similar institutions
          3) Central banks
          4) Alternative definitions of money
          5) Money supply
               a) Definition
               b) How money supply is determined
     B) Money demand and LM curve **Mankiw** 9th & **10th ed. Ch. 11-2; 11th ed. 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
          6) Replacing i with r
     D) Determination of r
          1) Money supply and demand graph
          2) What shifts money demand curve
               a) Y
               b) $E\pi$
          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 $E\pi$
               d) Increase in Y

E) The LM curve
  1) Intro
  2) Money supply, r and Y
  3) What shifts LM curve
    a) Change in M/P
    b) Change in $E\pi$
    c) Money-demand shock
F) IS and LM together
  1) In a graph
  2) In algebra
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

XI) What happens if a central bank chooses the money supply
  A) Introduction
  B) Assuming price level is fixed: IS-LM as a model of the economy **Mankiw 9th & 10th ed. 12-1; 11th 13-1**
    1) Intro
    2) Changes in G and T: "fiscal policy"
    3) Changes in M: "monetary policy"
    4) Changes in expected future inflation
    5) Other things that affect spending: "spending shocks"
      a) Consumption
      b) Investment
    6) Money demand shocks
  C) Allowing the price level to vary: the AD curve **Mankiw 9th & 10th ed. 12-2; 11th 13-2**
    1) Intro
    2) How a change in P affects Y: slope of AD
    3) What shifts AD
      a) M^S
      b) $E\pi$
      c) G & T
      d) Other
      e) IS-LM in algebra
    4) $\overline{P}$: the price level that makes $Y = \overline{Y}$
      a) Potential output, natural rate of interest, and $\overline{P}$
      b) What affects $\overline{P}$?
        i) Change in money supply
        ii) Change in fiscal policy
        iii) Other
    5) IS-LM and AD in short run and long run

XII) Determination of the price level: Aggregate supply **Mankiw 9th & 10th ed. Ch. 14; 11th Ch. 15**
  A) Intro
      C) Two theories of business cycles
      1) Real business cycle theory
      2) Keynesian business cycle theory
        a) Prices sticky
        b) Questions raised by Keynesian theory
  D) Background

1) Okun's law and natural rate of unemployment
2) Math trick
   a) Proportional or percent change and change in log
   b) Apply to inflation rate
E) Preview: many ways to say same thing
   1) Phillips curves and AS curves
   2) How are they the same?
   3) Theories (models)
F) Development of expectations-augmented Phillips curve
   1) 1950s-early 1960s
   2) Late 1960s on
   3) Early 1990s on
   3) Explanation: expectations-augmented Phillips curve
   4) Why did expectations change?
G) Types of inflation expectations
   1) Anchored or static expectations
   2) Adaptive expectations
   3) Rational expectations
H) AS and AD together
   1) Review: *AD, P* and *Y* in "short run" and "long run"
   2) What we will do now
   3) AD shock when $E\pi$ is anchored, equal to zero
      a) How SRAS works here
      b) What happens
         i) Before shock (period 0)
         ii) Shock hits (period 1)
         iii) Period after shock (2)
         iv) Period after that (3)
         v) Long run
   4) Steady long-run trend inflation
      a) M^S growth and AD curve
      b) What must happen in long run
   5) Change in rate of M^S growth
      a) Intro
      b) If expectations are rational and people see what central bank is doing
      c) If expectations aren't rational or people can't see what central bank is doing
      d) "Sacrifice ratio"

XIII) Why central banks set interest rate not money supply **Mankiw 9th pp. 345-46; 10th pp. 341-42; 11th p. 314-15**
   1) Review: setting *M* versus *r*
   2) What happens if you set interest rate
      a) Money-demand shocks
      b) Spending shocks
   3) What happens if you set money supply
      a) Spending shocks
      b) Money-demand shocks
   4) Summary

XIV) Our economy
   A) What our central bank does

        1) Set r not M

        2) Target inflation rate

B) Review: IS curve and expectations-augmented Phillips curve

C) What to do

        1) If $E\pi = \pi^T$

        2) If $E\pi > \pi^T$

        3) $E\pi < \pi^T$

D) Why recessions happen

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

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

            a) What happens

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

                i) Wrong about position of IS

                ii) Wrong about $\bar{Y}$

E) The recession of 2008 and why the slump

        1) Surprise backward shift in IS

        2) Liquidity trap (zero lower bound)

        3) Perverse fiscal policy

F) Recovery from the Covid crisis

        1) Review: "supply" or "cost-push" shock

        2) Rapid inflation in winter 2021-22

        3) Will expectations remain anchored?