



Faculty of Engineering
Mechanical Engineering Department

Introduction to Engineering Economics

Dr. Ashraf Abdelkhalig

Required Textbooks

- Sullivan, Wicks and Koelling. Engineering Economy, 15th Edition. 2012.
- White, Case and Pratt. Principles of Engineering Economic Analysis. 5th Edition.

Introduction

- **Objective:** This course is basically about how to decide to do things, or compare alternatives in terms of money.
- Contrasted with such subjects as quantum physics, which deal with the secrets governing the burning of stars, engineering economics deals only with the sordid details of handling money.
- On the other hand, it's easy. There is a certain amount of mathematics involved, but nothing beyond tenth-grade level. There are no difficult concepts to be mastered.
- There is one new idea -- **that money has a time value!**

Introduction

- Engineering Economics is needed to complete engineering itself; without an economic background, most engineering problems are trivial.
- For example, the problem of *air pollution* could easily be solved by giving everyone an **electric car**.
- It is only when we add the economic constraint that electric cars are too expensive for most people that the real engineering begins.

Introduction

- Furthermore, this is almost certainly the first of the courses you've taken which you'll find directly useful, and you can expect to go on using it for the rest of your life:
 - whenever you buy a car,
 - get a mortgage,
 - consider life insurance or start your own company.
- Among other things, you should be able to use it to compare the financial advantages of going to graduate school versus starting work immediately.

Example: Getting a Car

2015 SUBARU FORESTER 2.5i
AVAILABLE IN SATIN WHITE PEARL

APR AS LOW AS 1.9% OAC

SALE PRICE: **\$23,916**
MSRP: \$25,522

class of 2014 SUMMER CLEARANCE

ONLY 1 AT THIS PRICE! STOCK #S50152 MODEL FFB-02
Price plus tax, title and license. On approved credit. Subject to prior sale.

REQUEST MORE INFO

2014 AUDI A8 3.0T STYLE PREMIUM PLUS



\$999 per mth plus tax
\$5000 plus first mth payment due at signing

Cold Weather Drivers Assistance Media Package

MSRP \$88,180

Use the Request More Info Form Below



STOCK# U44125 Lease is for MSRP of \$88,180. 36mth 10k miles plus tax tag and fees. With Approved credit. Image is for illustration purposes only. See Jim Ellis Audi Marietta for details. Offer Ends 6/30 Deal #522626

KICKOFF SAVINGS EVENT

Lease for **\$199** /MO* OR **0% APR** Financing for 72 Months**

NO PAYMENTS for 90 Days OR **\$3,600** off MSRP**

NEW 2017 TOYOTA Camry SE

RICE ADVANTAGE

*For well-qualified lessees with approved credit through Southeast Toyota Finance. Not all lessees will qualify. Model #2546. \$199 per month for 36 months. \$2,399 down payment, \$199 first month's payment and \$895 acquisition fee due at signing. No security deposit required. \$22,123 Adjusted Capitalized Cost is based on down payment, excludes tax, tag, title and \$469 dealer fee. Monthly payments do not include applicable taxes. Cannot be combined with any other offers. Expires 08/30/16.
**Plus tax, tag, title and \$469 dealer fee. 0% APR financing available for up to 72 months with a monthly payment of \$13.89 per \$1,000 financed. Not all will qualify. On select models with approved credit. Discount off MSRP provided by dealer. Plus tax, tag, title and \$469 dealer fee. On select 2017 Toyota Camry SE in stock models only. Offer expires 08/30/16.

MSRP: \$19,870

New 2016 Volkswagen Jetta S

SALE PRICE: **\$16,209***

\$500 Special Inventory Bonus*

OR **0% APR***

\$119 PER MONTH LEASE*

Making Economic Decisions

- Decision making is a broad topic, for it is a major aspect of everyday human existence.
- There are lots of problems in the world:
 - 1) **Simple Problems**
 - Should I pay or use credit?
 - Shall we replace a water pump?

Making Economic Decisions

2) Intermediate Problems (mainly economic)

- Which equipment should be selected for a new assembly line?
- Which materials should be used as roofing and structural support for a new building?
- Which printing press should be purchased? A low cost press requiring three operators, or a more expensive one needing only two operators?

3) Complex Problems (mixture of economic, political, and social)

- Setting the annual budget for a corporation.
- The decision of Mercedes Benz to build an automobile assembly plant in Tuscaloosa, Alabama.

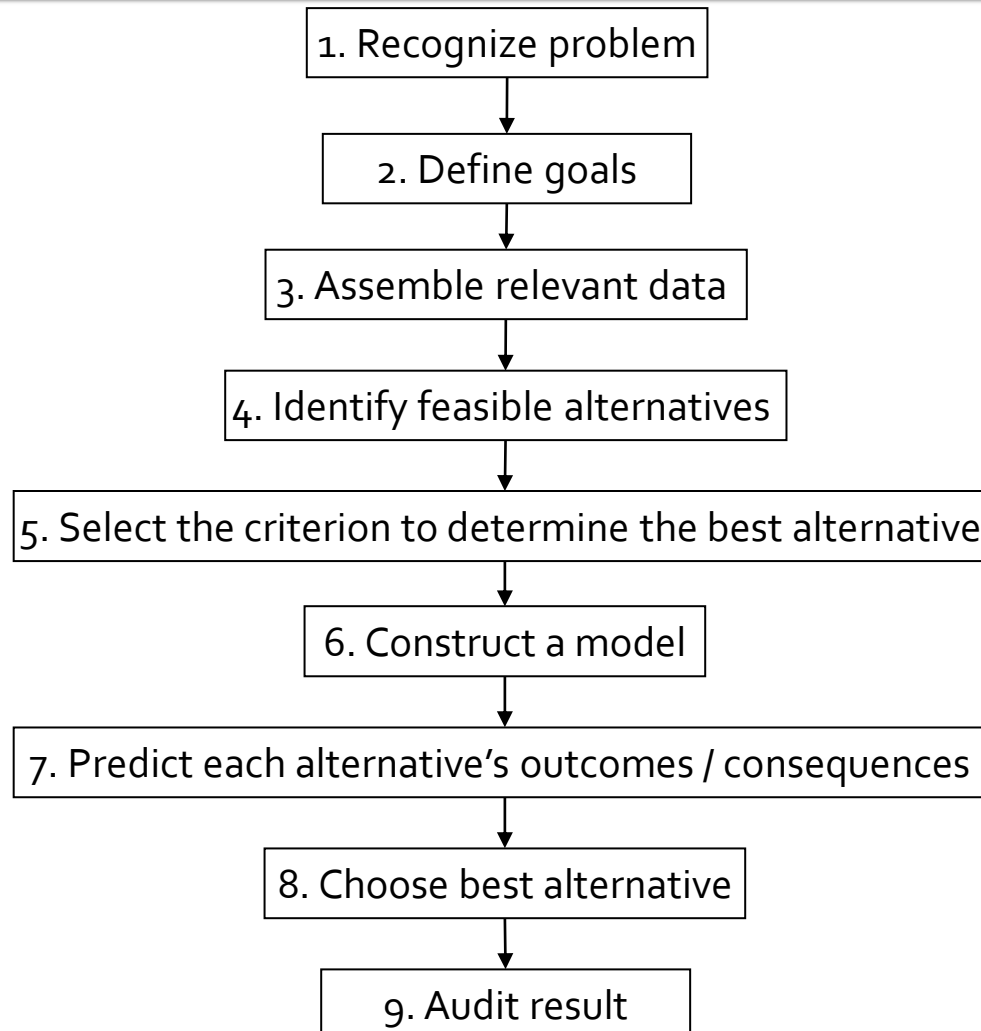
Large-Scale Engineering Projects

- These typically:
 - require a large sum of investment;
 - can be very risky;
 - take a long time to see the financial outcomes;
 - lead to revenue and cost streams that are difficult to predict.

Engineering Economic Decisions in Manufacturing Sector

- Service improvement;
 - Equipment and process selection;
 - Equipment replacement;
 - New product and product expansion,
 - Cost reduction.
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- Cost reduction or profit maximization can be seen as generic (common, eventual) objectives.
 - In the most general sense, we have to make decisions under resource constraints, and in presence of uncertainty.

Rational Decision Making

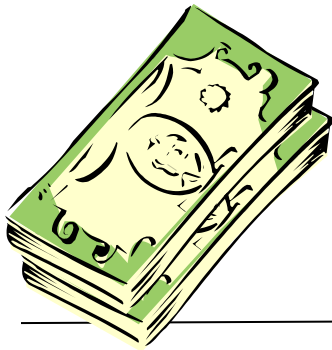


Fundamental Principles of Engineering Economics

- 1) An instant dollar is worth more than a distant dollar;
- 2) Only the relative (pair-wise) difference among the considered alternatives counts;
- 3) Marginal revenue must exceed marginal cost, in order to carry out a profitable increase of operations;
- 4) Additional risk is not taken without an expected additional return of suitable magnitude.

Principle 1

- An instant dollar is worth more than a distant dollar.



Today



6 months later

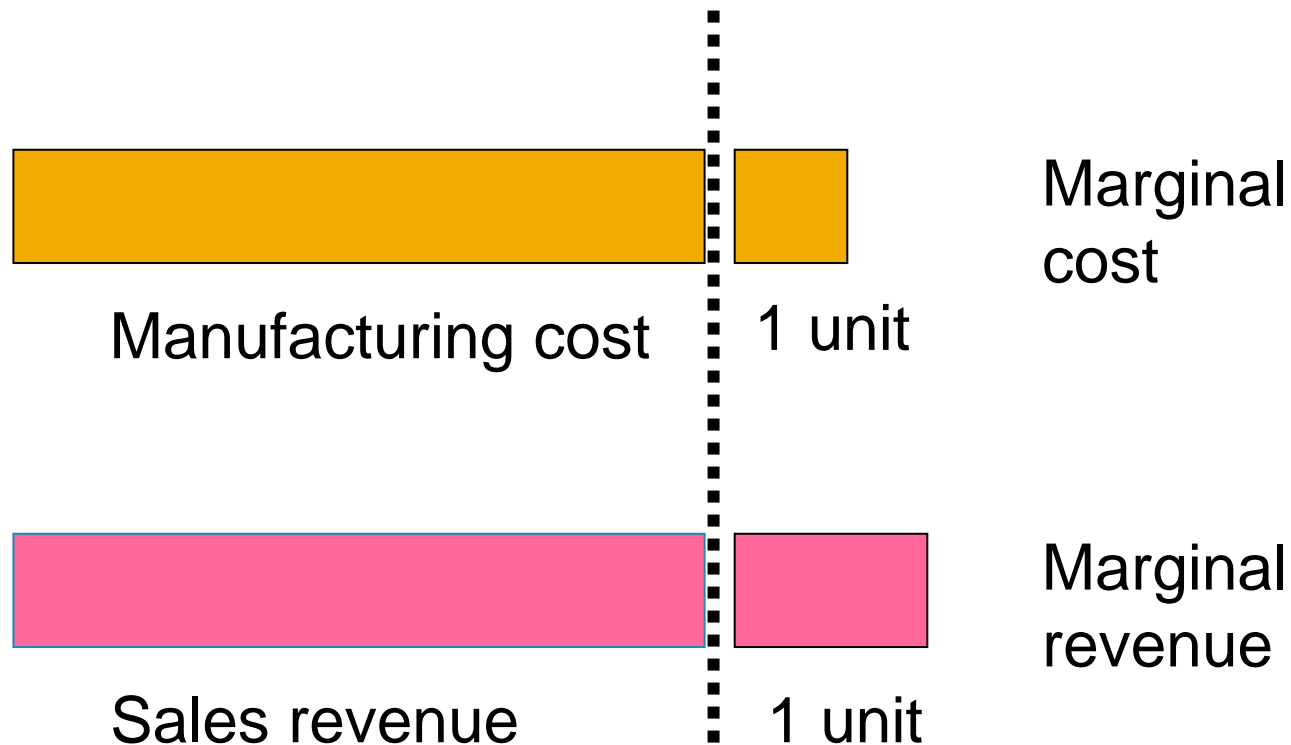
Principle 2

- Only the cost (resource) difference among alternatives counts.

Option	Monthly Fuel Cost	Monthly Maintenance	Cash paid at signing	Monthly payment	Salvage Value at end of year 3
Buy	\$960	\$550	\$6,500	\$350	\$9,000
Lease	\$960	\$550	\$2,400	\$550	0

Principle 3

- Marginal (unit) revenue has to exceed marginal cost, in order to increase production.



Principle 4

- Additional risk is not taken without a suitable expected additional return.

Investment Class	Potential Risk	Expected Return
Savings account (cash)	Lowest	1.5%
Bond (debt)	Moderate	4.8%
Stock (equity)	Highest	11.5%

Thank you

Your questions are welcome 😊

ashraf.891.am@gmail.com

