Why people want to be a Mechanical Engineer?

- Personal interest
- Interested in machine
- Easy to find job
- The country need engineers
- Want to invent
- Love cars
- My parents want me to be
- Not sure
- …
The art and science by which the properties of matter are made useful to man, whether in structures, machines, chemical substances, or living organisms.

The discipline dealing with the art or science of applying scientific knowledge to practical problems.
Mechanical Engineers Do What?

- Transmit, transform or make use of energy.

- Energy
  - Heat
  - Kinetic Energy
  - Potential Energy
    - Gravitational
    - Elastic
    - ...

Energy types:
- Heat
- Kinetic Energy
- Potential Energy
  - Gravitational
  - Elastic
  - ...
Mechanical Engineering is Part of Evolution

- Second oldest engineering major of mankind.
- Civilization began with *Fire* and *Wheels*. (see 2001)

*Give me a place to stand and I will move the earth.*
- Know maths and science well.
- Understand and predict related phenomena.
- Apply the knowledge to practical situation.
- A profession regulated by Council of Engineers.
Major Areas of Mechanical Engineering

- Heat and Energy
- Fluid Mechanics
- Dynamics, Vibrations and Controls.
- Solids and Machine Design
Careers

### Professional Engineers
- Operation and Development of Production Processes.
- Supervision of Construction Projects.
- Maintenance of Machines
- Design
- Provide Consultation

### Others
- Research
- Innovation
- Teach
- Management
- Salesperson
- Etc.
Operation and Development of Production Processes.

- Problem solving
- Process improvement
- Quality control
- Safety Engineer
- ...
Design

Every line will be built.

Mistakes in exam reduce the score but mistakes in design....

• Structures
• Systems
• Machines
• Processes
Education provides some knowledge and leads to systematic thinking. The rest is learnt from experiences (or mistakes).
Consultation

Consultants must have Knowledge + Experience.
Teaching

Education help developing the country.
When you have nothing to do, let's conduct a research to find out what to do.
Qualifications

- Hard working.
- Systematic.
- Attention to detail.
- Eager to learn new technology.

Let’s push hard, in the right direction.
Overall Picture

[Diagram with labels: Depth, Width]
Curriculum Overview

- 4 years (8 semesters).
- About 20 hours per week of lecture (20 credits).
- About 6 subjects per semesters.
- ประมาณ 6 วิชา.
- Total 146 credits.
- Choose the major in the 2nd year.
Basic Skills

- Mathematics and Geometry
- Physics
- Chemistry
- English
- Computer
Teaching and Evaluation Method

- Lecture
- Laboratory
- Practical Training
- Project
- Quiz
- Written Exam
- Software Practice/Simulation
1st Year – General Basic Courses

- **Mathematics** ➔ MA111 + MA112
  - Calculus
  - Algebra
  - Differential Equation
- **Geometry** ➔ ME100
- **Physics** ➔ SC133, 134, 183, 184
  - Include electricity
- **Computer** ➔ CN101
- **English** ➔ ELXXX
- **Material** ➔ IE121
- Some chemistry ➔ SC123, SC173
2nd Year – Engineering Basic Courses

- CE202 Statics
- ME220 Dynamics
- ME240 Fluid Mechanics
- ME200 Mechanical Drawings
- ME210 Mechanics of Solids
- ME230, 231 Thermodynamics
- IE261 Engineering Statistics
- Maths + Manufacturing and Electrical Engineering Courses
1) Create a solid model of the following object.
1) Two simply supported beams were set up in a cross pattern as shown. Both beams have the same thickness, $b$ and length $L$ but with different heights.

1.1) Determine the maximum deflection.

1.2) If force $F$ is gradually increased, which one of the beam will fail first?

<table>
<thead>
<tr>
<th>Beams</th>
<th>Young’s modulus</th>
<th>Area moment of inertia</th>
<th>Length</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>$E$</td>
<td>$I$</td>
<td>$L$</td>
<td>$H$</td>
</tr>
<tr>
<td>B</td>
<td>$E$</td>
<td>$2I$</td>
<td>$L$</td>
<td>$2H$</td>
</tr>
</tbody>
</table>

In the top surface, $\sigma = g(x)$ with location $x$. How is it safe?

\[
\sigma = \frac{1}{2} E I \frac{d^2}{dx^2} g(x)
\]

In the bottom surface, $\sigma = \frac{1}{2} E I \frac{d^2}{dx^2} g(x) + \frac{1}{2} E I \frac{d^2}{dx^2} g(x - L) - \frac{1}{2} E I \frac{d^2}{dx^2} g(L - x) + \frac{1}{2} E I \frac{d^2}{dx^2} g(L)
\]

Load case:

\[
F \left( 0.5 (1 + x/L) \right)
\]
1. The two bars, $AB$ and $BC$, are released from rest at the position $\theta$ with spring $AC$ at free length. Determine the angular velocity of $AB$ at the instant it becomes horizontal. Neglect the mass of the roller at $C$. Bar $AB$ has a mass $m$ and length $L$, bar $BC$ has a mass $2m$ and length $2L$. The spring has a constant $k$ that is small enough to allow the bars to travel to the horizontal position.
3rd Year – Mechanical Engineering Courses

- ME300 Lab 1
- ME310, 311 Mechanical Design
- ME320 Mechanics of Machines
- ME321 Measurement and Instrumentation
- ME322 Mechanical Vibration
- ME323 Mechatronics
- ME330 Internal Combustion Engine
- ME331 Heat Transfer
- Practical Training
Example of Examination – ME310/311

[1] I-Beam
2 m. long


1:2 ratio

Clutch

[5] Double block brake
(w/ power screw)

[6] Bearing
(2 sets)
DESIGN PROJECT 1: Optimum Reinforcement of Plate Structures

Theoretically, an $a \times a$ square plate of thickness $t$ subjected to a uniformly distributed load $q$ has the maximum stress at the midpoints of its edges of

$$\sigma_{\text{max}} = 0.287q \frac{a^2}{t^2}$$

and the maximum deflection,

$$u_{\text{max}} = 0.00406 \frac{a^4 q}{D}$$

where $D = \frac{E}{(1 - \nu^2)} a$ and $I = at^3/12$. Neglect gravity.
4th Year – Engineering Basic Courses

- ME400 Lab 2
- ME420 Automatic Control System
- ME430 Air Conditioning and Refrigeration
- Senior Project
- Options
  - Energy Conversion
  - Finite Element Methods
  - Engineering Piping System Design
  - Automotive Engineering
  - Special Topics
  - Etc.
A lots of Tables and Charts
A Reminder on Performance of First Year Students
About ME at TU

- 18 Faculty Members
- 2 Professors
- A lot of researches
- A lot of practical works
Activities

- Innovation Competition
- TSAE Auto Challenge
You are Welcome to Join

For more info. visit www.me.engr.tu.ac.th
Question?

Good Luck

Enough!