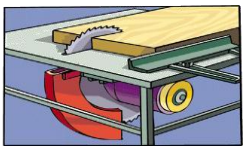
Sveučilište u Splitu
Sveučilišni studijski centar za stručne studije

TECHNICAL ENGLISH LANGUAGE FOR MECHANICAL ENGINEERING

Silvana Kosanović, PhD, senior lecturer

Split, April, 2016

Technical English for Mechanical Engineering



Course Objectives

The main aim of this course is to enable students to use all language skills (listening, reading, writing and speaking) in academic and technical English. Students will strive to develop ability to read and comprehend technical texts in the field of Mechanical Engineering. This field covers a wide range of related topics. The student will be exposed to a variety of texts dealing with general notions in engineering, but also property classifications of materials, forces on materials, computer-assisted manufacturing and computer integrated manufacturing, sustainability and similar. Students will be expected to cope with input texts, i.e. listening and reading in the discipline and produce output texts in speech and writing.

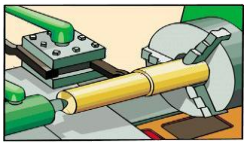
The skills emphasized in this course will be the following:

- coping with texts in the discipline (input – listening and reading and output – speech and writing),
- vocabulary building through the study of word construction,
- taking notes, writing formal definitions of technical terms and expressions,
- analyzing information presented in graphs, charts, tables, etc.,
- presenting and producing written output on selected topics ,
- recognizing various grammatical structures.

Learning Outcomes:

Upon successful completion of this course, student should be able to:

- read and listen to mechanical engineering contents,
- produce texts in speech and writing on given topics in the discipline,
- produce oral presentations on given topics in the discipline and actively participate in communication in the target language,
- produce essay assignments on given topics in engineering,
- develop transversal skills such as writing reports, summaries and professional papers, creating portfolio of works.



Course Policy

- Required attendance for full-time students is 70% of the total of classes and for part-time students 50%.
- As all oral discussions held in class are part of the learning process, students are responsible for taking notes and reviewing their content before the tests.
- Public presentation is obligatory and makes part of the final grade, as well as written assignments completed during the duration of the course and collected in student's portfolio of works.

Grade breakdown

Class Attendance and Participation	10%
Portfolio of works	25%
Two mid-term exams	50%
Presentation	15%

Recommended course book

1. Dunn, M.; Howey, D.; Ilic A.; Regan, N. (2012) *English for Mechanical Engineering in Higher Education Studies.* Garnet education. Course book

Reference Books

1. Bonamy, David (2011) *Technical English 3*, Pearson, Longman, Essex.
2. Glendinning, E.H., Glendinning, N. (2001) *Oxford English for Electrical and Mechanical Engineering.* Oxford University Press. Oxford.
3. *Dictionaries:* A suitable English - English dictionary is strongly recommended (Oxford - Advanced Learners Dictionary, or Webster's New Collegiate Dictionary). In addition, Chambers Dictionary of Science and Technology may be consulted for exact definitions of technical terms.

Supplementary Activities and Materials

- Materials which provide new and recent findings; articles in related fields
- Videos or films, if available and appropriate- Moodle, You tube
- Students' presentations and written assignments collected in student's portfolio

Recommended Links

- Moodle platform: https://moodle.oss.unist.hr/
- Garnet online resources: http://www.garnetesap.com/englang.php
- Mechanical Engineering Magazine
- Academic Press Dictionary of Science and Technology: http://www.gecdsb.on.ca/d&g/apr00/web1.htm
- Journal of Mechanical Design
- http://www.wikipedia.org/
- http://wordweb.info/
- http://www.eudict.com/

Contact Your Teacher

Silvana Kosanovic, PhD, sen. lecturer
Teachers' office hours are held in Kopilica 5, Zavod za jezike
e-mail: skosanov@oss.unist.hr

Course title	TECHNICAL ENGLISH LANGUAGE
Course code	SKS026
ECTS (Number of credits allocated)	2 Alignment of students activities with learning outcomes: Lectures: 30-seminar hours = 1 ECTS Mid-term exams (preparation and delivery): 6 hours = 0,2 ECTS Self-study: 21 hours = 0,7 ECTS Office hours and final exam: 3 hours = 0,1 ECTS
Lecturer(s)	Silvana Kosanović, PhD, senior lecturer
Learning outcomes and competences	• Enabling students to use all language skills (listening, reading, writing and speaking) in academic and technical English. On successful completion of this course, student should be able to: • read and listen to mechanical engineering contents • produce texts in speech and writing on given topics in the discipline • produce oral presentations on given topics in the discipline • produce essay assignments on given topics in engineering • actively participate in communication in the target language
Recommended reading	1. Dunn, Howey, Ilic (2009) *English for mechanical engineering in higher education studies*. Garnet education. 2. Bonamy, David (2011) *Technical English 3*, Pearson, Longman, Essex 3. Glendinning, E.H., Glendinning, N. (2001) *Oxford English for Electrical and Mechanical Engineering.* Oxford University Press. Oxford.
Teaching methods	• Seminars • Language practice • Task-based approach • Individual approach during office hours
Assessment methods	• Continuous assessment during the course • Oral presentation • Portfolio of written assignments • Final examination
Language of instruction	English
Quality assurance methods	• Periodic lesson observation undertaken by the superior in charge • Teacher self-evaluation • Student feedback on teacher performance and teaching materials

	• Regular course attendance • Test results • Collaborative peer group work	
UNIT 1: WHAT IS ENGINEERING? **Introductory lesson** 1.1. Choosing a course 1.2. Intro to engineering, video at: https://www.youtube.com/watch?v=qx9lLiAISAw 1.3. Introduction to engineering and general notions in engineering		2 hours
1.4. History of engineering, text 1.5. Main branches of engineering **Extending skills** 1.6. Organizing information in a lecture 1.7. Making notes, speaking from notes		2 hours
1.8. Reconstructing lecture from diagrams and notes 1.9. Guessing words in context 1.10. Affixes: Prefixes and suffixes		2 hours
UNIT 2: ENGINEERING ACHIEVEMENTS 2.1. Using an English- English dictionary, specific vocabulary building 2.2. The greatest achievements of mechanical engineering in the 20th century		2 hours
Extending skills 2.3. Refrigeration and air conditioning 2.4. Writing topic sentences to summarize *Students' Presentations (Air conditioning and refrigeration)*		2 hours

UNIT 3: FORCES ON MATERIALS 3.1. Materials and its physical properties 3.2. Related vocabulary and notions	2 hours
TEST 1 *Students' Presentations (High performance materials)*	2 hours
3.5. Types of forces: tension, compression, shear, torque, bending *Students' Presentations (Automobile, Laser and Fiber Optics)* **Extending skills** 3.6. Linking ideas 1	2 hours
UNIT 4: COMPUTERS IN ENGINEERING 4.1. Vocabulary related to computers, abbreviations and acronyms *Students' Presentations (Computers, Internet)*	2 hours
Extending skills 4.2. Computer Integrated Manufacturing (CIM) 4.3. Passive 4.4. Developing ideas in a paragraph *Students' Presentations (Household appliances, Telephone)*	2 hours
UNIT 5: FRICTION 5.1.Introductory video: https://www.youtube.com/watch?v=GdIfkPFLaoA 5.2. What is friction, kinds of friction, reading formulas 5.3. Describing graphs and trends 5.4. Reading: *Friction: blessing and curse*	2 hours
Extending skills 5.5. Finding main information in a text and identifying parts of sentence 5.6. Linking ideas 2 5.7. Paraphrasing and reporting findings *Students' Presentations (Airplanes, Spacecraft)*	2 hours
UNIT 6: ENGINEERING AND SUSTAINABILITY	

6.1. Concepts in engineering and sustainability 6.2. Life cycle 6.3. The three spheres of sustainability	2 hours
6.4. Reading: The Environmental, Economic and Social Components of Sustainability **Extending skills** 6.5. Essay writing: written assignment	2 hours
TEST 2 *Students' Presentations (Water Supply and Distribution, Renewable Sources of Energy)*	2 hours

CONTENTS

UNIT 1: WHAT IS ENGINEERING?

Introduction

This introductory unit explores the meaning of the term "engineering".
Read and listen to a series of mini-lectures which look at the history of mechanical engineering and different branches in engineering.

Lesson aims

- Identify words for the discipline in context
- Make notes from the given text
- Speak from notes

Warm up

1. WHAT IS ENGINEERING?

Task 1.
Discuss and give a brief definition of engineering.

Engineering is …..

2. SPECIALIZED VOCABULARY RELATED TO ENGINEERING

Mechanical engineering
The origin of the term: machine / mechanic
Engine(er): the word has the same root as lat."Ingenious" - very clever

Related words:

Mechanize (v) – to convert a process that machines can do it
Machine (n) a piece of equipment that uses power to do a job
Machine (as a verb) - to make something to a high degree of accuracy
Machinery (n) machines, esp. large ones
Mechanism (n) – 1. the part of a machine that does a specific job
2. a way of working or a process for doing something Mechanics – how things work

Reading

Read the article, look for the meaning of some underlined vocabulary and summarize the text by making notes in pairs.

Engineering

The American Engineer's Council for Professional Development has defined engineering as follows:

"The creative application of scientific principles to design or develop structures, machines, apparatus, or manufacturing processes, or works utilizing them singly or in combination; or to construct or operate the same with full cognizance of their design; or to forecast their behavior under specific operating conditions; all as respects an intended function, economics of operation and safety to life and property."

Engineers apply the knowledge of science (physics and mathematics mainly) to find suitable solutions to problems or to make improvements to the status quo. More than ever, engineers are now required to have knowledge of relevant sciences for their design projects; as a result, they keep on learning new material throughout their career.

The crucial and unique task of the engineer is to identify, understand, and interpret the constraints on a design in order to produce a successful result. It is usually not enough to build a technically successful product; it must also meet further requirements.

Usually multiple reasonable solutions exist, so engineers must evaluate the different design choices and choose the solution that best meets their requirements. Engineers typically attempt to predict how well their designs will perform to their specifications prior to full-scale production. Constraints may include available resources, physical, imaginative or technical limitations, flexibility for future modifications and additions, and other factors, such as requirements for cost, safety, marketability, productibility and serviceability. By understanding the constraints, engineers derive specifications for the limits within which a viable object or system may be produced and operated.

History

The concept of engineering has existed since ancient times as humans devised fundamental inventions such as the pulley, lever, and wheel. Each of these inventions is consistent with the modern definition of engineering, exploiting basic mechanical principles to develop useful tools and objects.

The term *engineering* itself has a much more recent etymology, deriving from the word *engineer*, which itself dates back to 1325, when and *engine'er*

(literally, one who operates an *engine*) originally referred to a "constructor of military engines". In this context, now obsolete, an "engine" referred to a military machine, i. e., a mechanical contraption used in war (e.g., a catapult). The word "engine" itself is of even older origin, ultimately deriving from the Latin *ingenium* (c. 1250), and meaning "innate quality, especially mental power, hence a clever invention."

Later, as the design of civilian structures as bridges and buildings matured as a technical discipline, the term civil engineering entered the lexicon as a way to distinguish between those specializing in the construction of such non-military projects and those involved in the older discipline of military engineering.

The Pharos of Alexandria, the pyramids in Egypt, the Hanging Gardens of Babylon, the Acropolis and the Parthenon in Greece, the Roman aqueducts, the Coliseum, the cities and pyramids of the Mayan, Inca and Aztec Empires, the Great Wall of China, among many others, stand as a testament to the ingenuity and skill of the ancient civil and military engineers.

The earliest civil engineer known by name is Imhotep. As one of the officials of the Pharaoh, Djosèr, he probably designed and supervised the construction of the Pyramid of Djosèr (the Step Pyramid) at Saqqara in Egypt around 2630-2611 BC. He may also have been responsible for the first known use of columns in architecture.

Ancient Greece developed machines in both the civilian and military domains. The Antikythera mechanism (an ancient mechanical calculator), the earliest known model of mechanical computer in history, and the mechanical inventions of Archimedes are examples of early mechanical engineering. These inventions required sophisticated knowledge of differential gearing or epicyclic gearing, two key principles in machine theory that are still widely used today in diverse fields such as robotics and automotive engineering.

Chinese, Greek and Roman armies employed complex military machines and inventions such as artillery (the trireme, the ballista, the catapult) which was developed by the Greeks around the 4th century B.C. In the Middle Ages, the trebuchet was developed.

Renaissance era

The first electrical engineer is considered to be William Gilbert, with his 1600 publication of De Magnete, who was the originator of the term "electricity".

The first steam engine was built in 1698 by mechanical engineer Thomas Savery. The development of this device gave rise to the industrial revolution in the coming decades, allowing for the beginnings of mass production.

With the rise of engineering as a profession in the 18th century, the term become more narrowly applied to fields in which mathematics and science were applied to these ends.

Similarly, in addition to military and civil engineering the fields then known as the mechanic arts became incorporated into engineering.

Modern era

Electrical Engineering can trace its origins in the experiments of Alessandro Volta in 1800s, the experiments of Michael Faraday, Georg Ohm and others and the invention of the electric motor in 1872. The work of James Maxwell and Heinrich Hertz in the late 19th century gave rise to the field of Electronics. The later inventions of the vacuum tube and the transistor further accelerated the development of Electronics.

The inventions of Thomas Savery and the Scottish engineer James Watt gave rise to modern Mechanical Engineering. The development of specialized machines and their maintenance tools during the industrial revolution led to the rapid growth of Mechanical Engineering both in its birthplace Britain and abroad.

Chemical Engineering, like its counterpart Mechanical Engineering, developed in the nineteenth century during the Industrial Revolution. Industrial scale manufacturing demanded new materials and new processes and by 1880 the need for large scale production of chemicals was such that a new industry was created, dedicated to the development and large scale manufacturing of chemicals in new industrial plants. The role of the chemical engineer was the design of these chemical plants and processes.

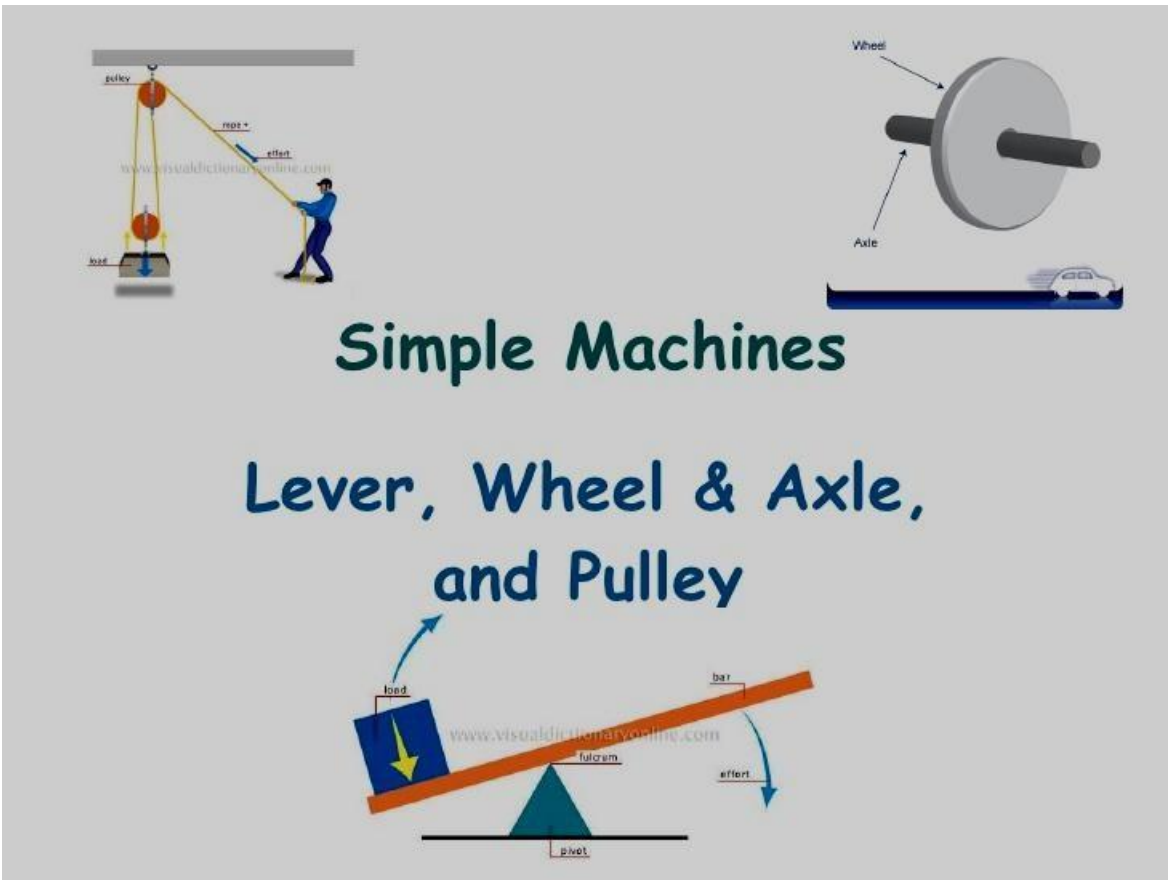
Aeronautical Engineering deals with aircraft design while Aerospace Engineering is a more modern term that expands the reach envelope of the discipline by including spacecraft design. Its origins can be traced back to the aviation pioneers around the turn of the century from the 19th century to the 20th although the work of Sir George Cayley has recently been dated as being from the last decade of the 18th century. Only a decade after the successful flights by the Wright brothers, the 1920s saw extensive development of aeronautical engineering through development of World War I military aircraft.

Adapted from: http://en.wikipedia.org/wiki/Engineering

Trireme- grčka galija
Ballista, trebuchet – katapult

Specialized vocabulary:

Historic inventions of simple machines
Pulley -koloturnik
Lever- poluga (seesaw, trebuchet)
Wheel – kotač
Axle- osovina



Mechanical engineering- Antikythera, differential gearing

Differential gearing –diferencijal (mehanički uređaj) okretni (obrtni) moment-torque, različite brzine, epiciklični diferencijal

EXTENDING SKILLS

MAKING MOST OF THE LECTURE

- by trying to record information during a lecture

The students learn the four Ps for preparing and attending a lecture: **Plan, Prepare, Predict and Produce.**

There are many ways/patterns in presenting information:

- question and answer
- problem and solution
- classification and definition
- advantages and disadvantages
- comparison and contrast
- cause and effect
- sequence of events
- stages of a process
- theories or opinions/ supporting information

NOTE- MAKING

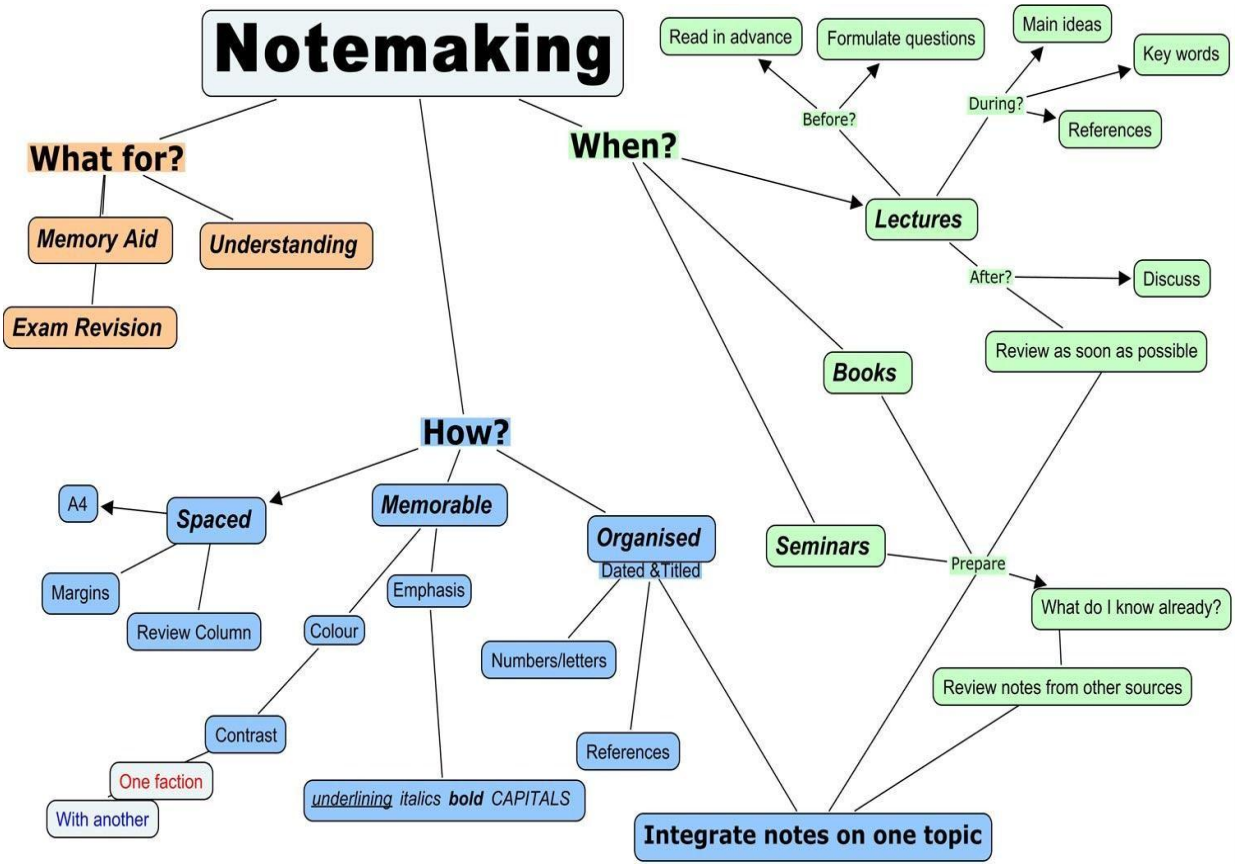
Using note-making can help you to:

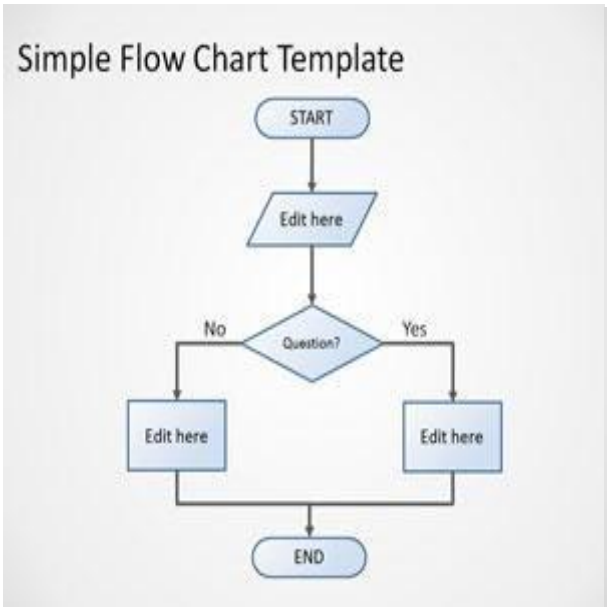
- concentrate on the subject in hand.
- record the most important details from lectures or seminars
- form a link between the new knowledge and what you already know
- remember the kind of information you want to record
- understand because you put ideas into your own words and/or diagrams
- review the lecture and use it for revision purposes

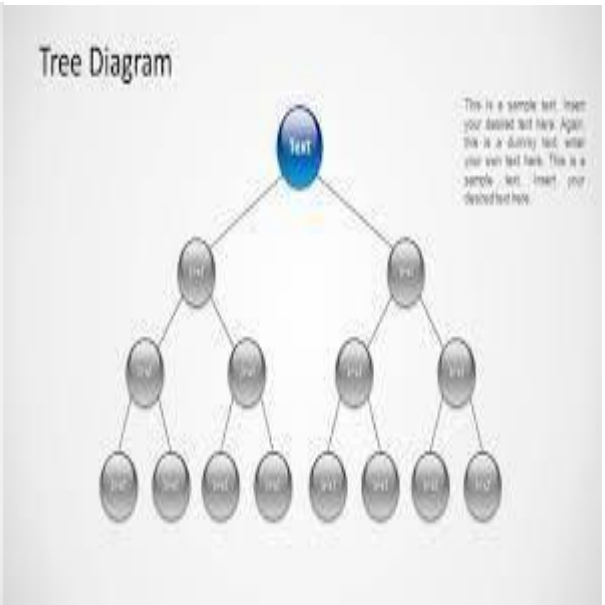
Active note-making means:

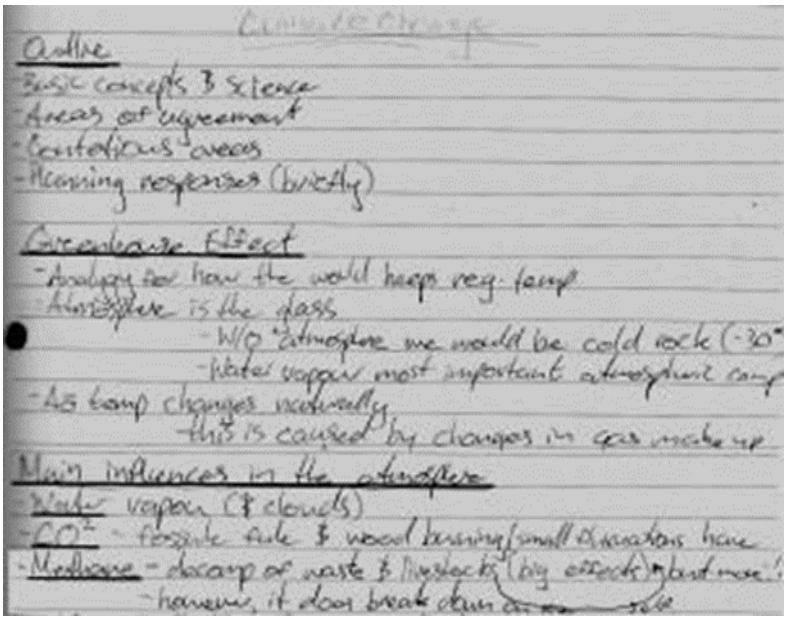
- thinking about what you want to get out of your research before you start
- looking for answers to any questions you may have about the topic
- looking for connections within the topic you're studying, and to other topics on your course
- writing notes mostly in your own words - your own explanation of what something says or means
- recording direct quotes only when it's important to have the exact words that someone else has used (i.e. when **how** they say something is as significant as **what** they say)

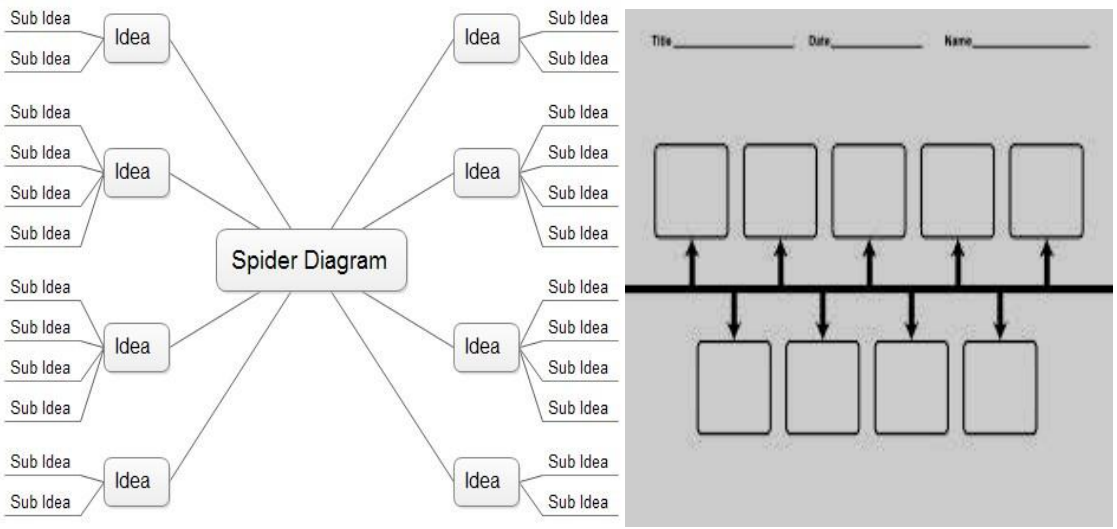
Some note-making types: linear notes (headings and notes), spidergrams, (mind maps) flow charts, tree diagrams, timetables…







Headings and notes 



timetable

Task 2.

Set for pair work. Make notes on the history of engineering by using different notemaking types. Having finished making notes, try to summarize the text by speaking from notes. The notes will later be pinned up in the classroom for further reference.

Language skills
SPECIALIZED VOCABULARY

Many words in academic English are the same as everyday vocabulary but they are often also used with a slightly different meaning, which may be specialized.

GENERAL ENGLISH AND SPECIAL TECHNICAL MEANING

Task 3.

Look for relationships between the meanings in general English and in engineering.

Word	**Specialized meaning**	**Use**
COAT	A layer	Coats of paint: top coat, undercoat, final coat of paint
CAP	To cover or seal	Cap an oil well
MOUNT	Put one thing onto another, or into its correct place	Mount an engine on the board
CYCLE	The stages of a circular process	There are four cycles in the operation
HOUSING	A box which is designed to hold something	Metal or plastic housing
COUPLE	Join together two things	Couple the two sections together
FEET	What it stands on	Feet of a machine
ARM	The part of a machine that extends	Arm of a crane
TEETH	The cutting edge	The teeth of circular saw
JAW	The sides of	Jaws of a vice or pliers

AFFIXES

PREFIXES AND SUFIXES

Some words are made up of different parts; for example “megabyte”. “Mega” is a prefix and “byte” is a base or root word. By adding prefixes or suffixes to the base word we can change its meaning.

Prefixes: a prefix is a group of letters that you can add to the beginning of a base word to change the meaning of the word. Every prefix has a meaning.

PREFIX	**BASE WORD**	**MEANING OF PREFIX**	**ANOTHER WORD**
Centi	metre	A hundredth	Centiliter
Inter	national	Between	Intercity
Kilo	gram	X 1,000	Kilobyte or K
Mega	byte	X 1,000,000 or very big	Megaton
Micro	meter	A millionth or very small	Microscope
Mili	litre	A thousandth	Milimetre
Mis	calculate	Do wrong	Misread
Over	heat	Do more than enough	Overtighten
Re	do	Do again	Recycle
Semi	circle	Half	Semiconductor
Sub	way	Under	Subsonic
Super	sonic	Over or bigger than	Supermarket
Trans	port	From one place to another	Transplant
Under	coat	Under or less than should be	Undercarriage
Un	do	Not, opposite	Uncouple

A suffix is a group of letters which you can add at the end of a base word to change the meaning of the word. For example: engine+er- engineer

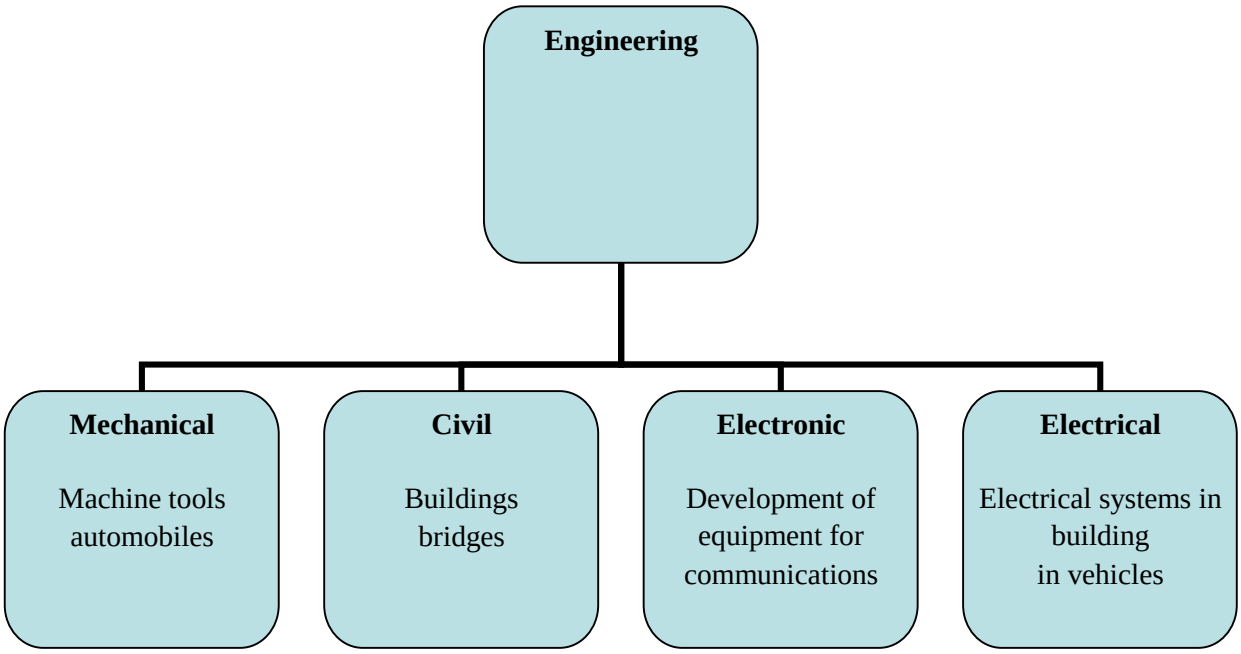
BASE WORD	**SUFFIX**	**MEANING OF SUFFIX**	**ANOTHER WORD**
Accura(te)	cy	Adjective→noun	Fluency
Class	ify	Make into	
Electric	al	Noun (electricity)→adjective	Mechanical
Engine	er	A person who does something or has a qualification in something	Mountaineer
Insulat(e)	or	Thing that does something	Conductor
Loos(e)	en	Make or make more	Tighten
Petrol	ogy	Study of	Geology
Pressur(e)	ize	Make into	Oxidize
Prevent	ion	Verb→noun	Invention
Replace	ment	Verb→noun	Improvement
Vary→vari	able	Can be	Replacable

Note: While with prefixes we rarely change the form of the base word, with suffixes it often changes.

Task 4. Identify the base word and the affix.

semicircle, expansion, distortion, telecommunications, subdivision, package, development, alteration, hyper-surface, malfunction, subset, silencer, interference, irreplaceable, semi-circular

Main branches of engineering include:



CIVIL ENGINEERING - which is concerned with making bridges, roads, airports, etc. (Građevinarstvo)

MECHANICAL ENGINEERING - which deals with the design and manufacture of tools and machines. It includes marine, automobile, aeronautical engineering as well as heating and ventilating. (Strojarstvo)

ELECTRICAL ENGINEERING - which is about the generation and distribution of electricity and its uses. It includes electricity production, its transmitting, electrical installation, lighting, etc. (Elektrotehnika)

ELECTRONIC ENGINEERING - which is concerned with development of low voltage equipment for communications, computing, etc. (Elektronika)

Vocabulary building

Task 5.
In an engineering context, what can you...?

1. tighten or loosen	4 widen	7 mechanize
2. strengthen	5 lengthen	8 assemble
3 weaken	6 engineer	9 mount

Task 6.
Use the following to create sentences: a machine, a component, vice jaws, a wheel, a screw, a beam, a rivet, a bridge, a working system, an assembly line, a crane jib.

Language study

deals with/is concerned with

Mechanical	machines
Electrical	electricity

1. Mechanical engineering ***deals with*** machines.
2. Mechanical engineers ***deal with*** machines.
3. Mechanical engineering ***is concerned with*** machines.
4. Mechanical engineers ***are concerned with*** machines.

Task 7.
Fill in the gaps.

The main branches of engineering are civil, _____, _____ and electronic. Mechanical engineering is_____ _____machinery of all kinds.

This branch of engineering includes_____, automobile, _____ and heating and ventilating. The first three are concerned with transport: _____, cars and planes. The last _____ with air-conditioning, refrigeration, etc.

Electrical engineering deals with_____ from generation to use. Electricity generating is concerned with _____ stations. Electrical installation deals _____ cables, switchgear, and connecting up electrical equipment.

Chemical engineering is_____ _____ the development and manufacture of chemicals.

All engineers _____ science in order to produce a successful result.

Task 8.
Listen to the tape and fill in the gaps.

In the United Kingdom you can _____ engineering at a college of further education or at a university. Most college courses _____ from one to two years. University undergraduate courses _____ engineering last from three to four years. A college will take _____ after four years of secondary school education. Most students study full-time, _____ day-release courses are available for people who _____ in local engineering companies. Students will be given a certificate _____ a diploma at the _____ of their course.

Most university students will have completed six _____ of secondary school. Others will have taken a diploma course at college. _____ give degrees. A Bachelor's degree _____ three to four years. A Master's _____ requires a further year.

2. ENGINEERING ACHIEVEMENTS

Introduction

Unit 2 looks at engineering achievements in recent times.
The text explores the history of refrigeration and air conditioning.
The language review section focuses on using research questions to find relevant information in a text.

Lesson aims

- Use research questions to focus on relevant information in a text
- Write topic sentences
- Summarize a text

Warm up

Specialized vocabulary

The students learn how to make full use of an English-English dictionary Example:
The root and the derived forms:

Mach: /root/ 1. The speed of sound
Machine: a) n. a piece of equipment that uses power to do a job
b) v. to make or change something using a machine
Machinery: machines, especially large ones
Machinist: n. person operating machines
Mechanic: n. a person repairing vehicles and machinery
Mechanical: adj. relating to machines
Mechanics: n. the science of the effects of forces on objects
Mechanism: 1. n. The part of a machine that does a specific process
2. A way of working or a process for doing something
Mechanize: v. to convert a process so that machines can do it
Mechanized: adj. done by machines

Task 1.
Look up the words in a dictionary, identify parts of speech and find main and technical meaning.

Word	**Part of speech**	**type**	**Main meaning**	**Technical meaning**
Operate	v	T	Do a surgical procedure	Make a machine work
Friction				
Sealed				
Shaft				
Code				
Radiator				
Patent				
Apparatus				
Elevator				
Condense				
Pressure				
Fluid				
Device				

Task 2

Before reading the text on refrigeration and air conditioning look at the greatest achievements of mechanical engineering in the 20th century as chosen by the readers of *Mechanical Engineering* magazine and discuss effects of each achievement.

Set for general discussion.

Achievement	Definition	Effect
The automobile	The car	It made it possible for people to get around quickly, to carry goods.
The Apollo missions to the Moon		
Power generation		
Agricultural mechanization		
The airplane		
The mass production of integrated circuits		
Refrigeration and air conditioning		
CAD and CAM		
Bioengineering		
Codes and standards		

EXTENDING SKILLS

Preparing and giving a presentation

Presentation guidelines

What makes a good presentation?
Enthusiasm for the subject / business of presenting it
What contributes to the success of a good presentation?

- Knowing your audience – who they are and why they are there
- Knowing your subject and what you are aiming to achieve
- Having a clear structure (introduction, main points, conclusion)
- Making logical connections between the points (examples/evidence)
- Having a good sense of timing
- Speaking from notes and not reading
- Using good visual aids
- Maintaining eye contact with audience: talk to them, not the slide
- Making people laugh……..and think.

Task 3 Look at an example of good and bad presentation at
https://www.youtube.com/watch?v=S5c1susCPAE

How to become a good presenter?

- Leave Nothing To Chance
- Know Exactly How To Start
- Get Straight To Your Point
- Talk To Your Audience
- Know What Works
- Be Concise
- Speak Naturally
- Know Your Audience
- Treat Your Audience As Equals
- Be Yourself
- Take Your Time
- Don’t Make A Special Effort To Be Funny
- Let Your Visuals Speak For Themselves
- Never Compete With Your Visuals
- Develop Your Own Style
- Enjoy The Experience
- Welcome Questions From Your Audience
- Finish Strongly

PRESENTATION TIPS AND USEFUL LANGUAGE	
Greetings / Getting started /stating your purpose	
Fairly formal Perhaps we should begin. Good morning, ladies and gentlemen… My name's … I'm responsible for… This morning I'd like to … discuss report on and present	**More friendly** OK, let's get started. Morning, everyone. I'm … I'm in charge of… What I want to do this morning is… talk to you about tell you about and show you
Outlining the talk I've divided my talk into five main parts: First(ly)… second(ly)… third(ly)… fourth… I'd like firstly to talk about… The second part will concern… In the third part I'll deal with… And finally, I shall raise briefly the issue /address the problem…	**Ground rules** If you have any questions… …please feel free to interrupt. …I'll be glad to answer them at the end of my talk Perhaps we can leave any questions you may have until the end of presentation.
Moving to a new point (Signposting) Simple phrases guiding the audience: To move on To go back To summarize To expand on To recap To turn to To digress To conclude To elaborate on	**Basic techniques used to effectively get your message across / Highlighting** Using intensifiers to emphasize certain points: really, absolutely, actually, completely, definitely I'd like you to ask yourselves a simple question. Emphasizing words or phrases: WHAT… I'd like you to do now IS … We can't expect too much too soon. WHAT we can't do IS … It is important / significant / interesting to point out… The important / significant / interesting thing to point out is … Using repetition of words, statements, key words.

Starting your first part To start with…, First of all, then… Firstly,… **Finishing a part** Well, that's all I have to say about… So that, then, is… **Starting a new part** Let's move on now to… The next point I'd like to make is... **Referring back** As I mentioned earlier… If you remember, I said at the beginning… **Referring forward** As we will see later,… **Referring to visuals** On the next slide you can see … This chart gives a comparison of… **Introducing your last point** And finally,… Lastly,…	**Summarizing** So now, I'd just like to summarize the main points. Let me sum up. **Concluding** In conclusion,… Well, that brings me to the end of my talk. I hope you have found my comments useful. **Inviting questions and comments** And now, if you have any questions, I'll be glad to answer them. Does anyone have any questions? **Ending** If there are no more questions or points, I'd like to thank you for your attention. **Using your voice** Pay attention to stress patterns; Learn lots of word partnerships – stressed words are content words; Pausing is a matter of choice, but better always after stressed words / at the end of a chunk; Vary the speed of your speaking / the tone of your voice.

Task 4

Choose your assignment on http://www.greatachievements.org/ and set a date for your presentation with the instructor.

The presentations have to be relevant and interesting, have a clear purpose and be well organized. Also, they need to be easy to understand with clear power-point visuals to support it. You can either work individually or be placed in pairs. The presentation should last 5 minutes (10 minutes total time/pair).

After each presentation, rate the following aspects of the presentation from 1 to 5 (1=unacceptable, 2=fair, 3=average, 4=good, 5=excellent).

	1	2	3	4	5
The presentation was interesting.					
The presentation was clear.					
The presentation had a logical structure.					
The student has made contact with the audience.					
Total_____/					

Language skills
Reading for purpose: Understanding and using questions
Writing a summary by using topic sentences

Text analysis is not always easy. Here are some general questions you should ask yourself before, during and after reading a piece of text that can help you understand the purpose of the text.

Suggestions before reading…

Look at headings, sub-headings, illustrations etc., and think: What information did they give me? What will I find out in this article?
Who wrote the text?
You should also decide how to record information during reading. Remember note-taking methods.

Suggestions while reading…

What themes/issues does the text raise?
Highlight the topic sentences and think: Which paragraph(s) give me the answer to my research questions?
What vocabulary words or references in the text do you not understand? Make note of them and look them up or ask.
Make notes.

Suggestions for after reading…

Think: Did the text answer my research questions?

Summarizing…

The topic sentences of a text normally make a good basis for a summary.
Try to paraphrase them; rewrite in your own words and add supporting information.
Check spelling and grammar and, if summary is longer, divide it into logical paragraphs.

Reading: ***Refrigeration and air conditioning,*** page 17: in Dunn, M.; Howey, D.; Ilic A.; Regan, N. (2012) *English for Mechanical Engineering in Higher Education Studies.* Garnet Education. Course book[1]

[1] This is the main textbook for the course and unless stated differently all the reading and listening extracts are taken from this book and annotated only with page numbers.

Refrigeration and air conditioning

Task 5
Answer research questions given below and come up with more research questions.

1. Which achievement is the text about?
2. What problem did people face in this area?
3. What was the turning point in solving the problem?
4. How did the solution change human life?
5. What do you expect to find in the other paragraphs?

Topic sentences:

- Before engineers learnt how to cool air, life was very different.
- The inventor of refrigeration was Jacob Perkins.
- In 1834, Perkins obtained a patent for vapor compression system of cooling.
- Perkins often does not get credit for his important invention, because he did not develop it.
- The work of Perkins and Harrison did not directly lead zo the cooling of rooms.
- After cooling machines, Carrier moved on to rooms.
- In 1922, Carrier built his first true air-conditioning machine.
- Mechanisms for cooling air have had a profound effect on human life all over the world.

Go back to the text and find out what information comes after each topic sentence. Suggest possible content. Write a summary of the text. Paraphrase the topic sentences. Add extra information and examples.

3. FORCES ON MATERIALS

Introduction

Unit 3 looks at properties of materials, such as flexibility and rigidity and the way engineers can use these properties to construct the effective machinery. It also looks at the forces which act on components: tension, compression, shear, torque, bending.

Lesson aims

- Predict lecture content before listening
- Make lecture notes
- Report research findings
- Formulate questions

Warm up
Materials, their properties and uses

Task 1 Set for general discussion

Name different materials you can see in the classroom.
Why are these particular materials used for that purpose? E.g. why is the door made of wood?
Which of these materials are commonly used in mechanical engineering?

Metals	**Steel**	**Aluminum**	**Plastics**	**Ceramics**	**Wood**	**Glass**	**Rubber**

Processes and Properties

Any engineering material has its own properties/qualities/characteristics which make it suitable for a particular purpose.
Below is the list of some mechanical properties, including translation into the Croatian language.

Table 1

PROPERTIES			
NOUN	TRANSLATION	ADJECTIVE	TRANSLATION-adjective
rigidity	krutost	rigid	krut
weather resistance	otpornost na vremenske uvjete	weather resistant	otporan na vremenske uvjete
chemical resistance	otpornost na kemijske utjecaje	chemical resistant	otporan na kemijske utjecaje

elasticity	elastičnost	elastic	elastičan
shock resistance	otpornost na šok dinamička otpornost	shock resistant	otporan na šok
self-lubrication	samopodmazivanje	self-lubricating	samopodmazujući
hardness	tvrdoća	hard	tvrd
machinability	strojna obradivost	machinable	strojno obradiv
fluidity	fluidnost, žitkost, tečljivost	fluid	tekuć, žitak
stiffness	krutost	stiff	krut
conductivity	provodljivost	conductive	provodljiv
scratch resistance	otpornost na grebanje	scratch resistant	otporan na grebanje
brittleness	krhkost	brittle	krhak
strength	čvrstoća	strong	čvrst
flame resistance	vatrootpornost	flame resistant	vatrootporan
lightness	lakoća	light	lagan
softness	mekoća	soft	mekan
ductility	duktilnost, rastezljivost	ductile	duktilan, rastezljiv
wear resistance	otpornost na trošenje	wear resistant	otporan na trošenje
density	gustoća	dense	gust
weight	težina	heavy	težak
pliability	savitljivost	pliable	savitljiv
toughness	žilavost	tough	žilav
durability	trajnost, izdržljivost	durable	trajan, izdržljiv
heat resistance	otpornost na visoke temperature	heat resistant	otporan na visoke temperature
clearness	prozirnost	clear	proziran
flexibility	savitljivost	flexible	savitljiv
malleability	kovkost	malleable	kovak
corrosion resistance	otpornost na koroziju	corrosion resistant	otporan na koroziju

Processing of materials is the series of operations that transforms industrial materials from a raw-material state into a finished part or product. The processes used to convert raw materials into finished products perform one or both of two major functions: first, they form the material into the desired shape; second, they alter or improve the properties of the material. Below is the table of the most common processes of forming or altering materials.

Table 2

PROCESSES			
VERB	NOUN	ADJECTIVE	Noun TRANSLATION
to cold roll	cold rolling	cold rolled	hladno valjanje
to foam	foaming	foamed	pjenjenje
to form	forming	formed	oblikovanje
to temper	tempering	tempered	popuštanje
to melt	melting	melted / molten	taljenje
to work	working	worked	obrada
to weld	welding	welded	zavarivanje
to be heat-treated	heat-treatment	heat-treated	toplinska obrada
to hard work	hard working	hard worked	hladno očvršćivanje
to heat	heating	heated	zagrijavanje, žarenje
to anneal	annealing	annealed	žarenje
to stamp	stamping	stamped	utiskivanje
to fire	firing	fired	pečenje
to cold work	cold working	cold worked	hladna obrada
to forge	forging	forged	kovanje
to soften	softening	softened	omekšavanje
to cast	casting	cast	lijevanje
to roll	rolling	rolled	valjanje
to machine	machining	machined	strojna obrada
to mo(u)ld	mo(u)lding	mo(u)lded	kalupljenje
to harden	hardening	hardened	kaljenje
to quench	quenching	quenched	kaljenje
to spin	spinning	span / spun	rotacijsko oblikovanje
to reinforce	reinforcing	reinforced	pojačavanje, armiranje
to polish	polishing	polished	poliranje
to insulate	insulating	insulated	izoliranje

Task 2.
Scan the table which follows to find a material which is:

1 soft
2 ductile
3 malleable
4 tough
5 scratch-resistant
6 conductive and malleable
7 durable and hard
8 stiff and brittle
9 ductile and corrosion-resistant
10 heat-resistant and chemical-resistant

Match the materials to the properties and explain where they could be used.

Materials	**Properties**	**Uses**
Metals		
Aluminium (or Aluminum)		
Copper		
Brass (65% copper, 35% zinc)		

EXTENDING SKILLS
Language skills: Making definitions
Linking sentences – using **which**

1. Aluminium is a light metal.
2. Aluminium is used to make aircraft.

Aluminium is a light metal **which** is used to make aircraft.

Adding extra information to a text by using: **which..., -for example...- ,such as...,**

Example: Aluminium is used to make aircraft, engine components and many items for the kitchen.

We can add extra information to the text like this:

Aluminum**, which is light, soft, and ductile,** is used to make aircraft, engine components **– for example, cylinder heads –** and many items for the kitchen, **such as pots**.
Listening and making predictions

Key vocabulary Alloy - legura, slitina Aluminium (aluminum, AmE[1]) Beam - greda, traverza Belt - remen Cantilever - konzola, ukliještena greda Column- stup Component Copper Deform Deformation Ductile Ductility Elastic	Elasticity Equal Equilibrium Equidistant - jednako udaljen Equivalent External Flexible Force Girder - nosač Internal Materials Opposite Overengineer Parallel Permanent	Rigid Rubber Shear Sheet - ploča Spring - opruga Steel Strain Stress Tension Torque - obrtni moment Underengineer Uniaxial - having a single axis Wire

Task 3.
Pre-listening: Predict the information of each listening section.
Listen to Parts 1, 2 and 3 and make notes. Write down the definitions of *stress, strain, elasticity and plasticity*

Part 1: *Choosing materials in engineering*
Part 2: *Features of stress*
Part 3: *Features of stress, strain, elasticity and plasticity*

Key word	**Definition**
Stress	
Strain	
Elasticity	
Plasticity	

[1] AmE- American English

TYPES OF FORCE

Look at lecture slides on page 27 of the course book and discuss ways the force is applied in each slide.
Based on the direction of the force there are five types of force:

Type of force	**Direction**	**Example**
Tension	Outwards, pulling	The cable of a crane
Compression	Inwards, pushing	An object in a vice
Shear	Parallel	Two plates riveted together
Torque	Turning, twisting	A key, a screwdriver, a drive shaft
Bending	Curving	The jib of a crane, a bridge, a car park

Language skills
Writing: **Linking ideas by using linking words**
Because, since, as, therefore, so, but

We use linking words and phrases to join ideas in a sequence, to show how the ideas are related. Some linking words can be used to join independent and dependent clauses in a sentence.

What words can we use to mark the links?

1. Mechanisms are important to us.
2. They allow us to travel.

Sentence 2 is a reason for sentence 1. We can link the two sentences like this: Mechanisms are important to us ***because / since/ as*** they allow us to travel.

1. Mechanisms deliver the power to do work.
2. They play a vital role in industry.

Sentence 2 is a result of sentence 1. We can link the two sentences like this:
Mechanisms deliver the power to do work ***so*** they play a vital role in industry.
Mechanisms deliver the power to do work; ***therefore*** they play a vital role in industry.

1. Friction is sometimes a help.
2. It is often a hindrance.

Sentence 2 contrasts with sentence 1. We can link the two sentences like this: Friction is sometimes a help ***but*** it is often a hindrance.

Task 4. Link these sentences:

1. Copper is highly conductive. It is used for electric wiring.
2. Weight is measured in Newtons. Mass is measured in kilograms.
3. Nylon is used for bearings. It is self-lubricating.
4. ABS has high impact strength. It is used for safety-helmets.
5. The foot pump is a class 2 lever. The load is between the effort and the fulcrum.
6. Friction is essential in brakes. Friction is a nuisance in an engine.

Grammar links in texts: Using pronouns to refer back in a text

One of the ways in which sentences in a text are held together is by grammar links. In this extract, note how each expression in italics links with an earlier expression. This avoids repeating the same noun immediately or soon after the first mention.

Another very important force in engineering is the one caused by elasticity. A good example of *this* is a spring. Springs exert more force the more *they* are stretched. *This* property provides a way of measuring force.

Sometimes these links cause problems for readers because they cannot make the right connection between words in different parts of a text.

Study these common grammar links:

1 A repeated noun becomes a pronoun. *Springs* becomes ***they.***

2 A word replaces an earlier expression. *Force in engineering* becomes ***one.***

3 A word replaces a whole sentence or clause.

Springs exert more force the more they are stretched becomes ***This property****.*

Task 5. With which earlier expressions do the words in italics link? Join them as in the example above. Use also, they, their, ones, it. You might need to use the same word twice.

Friction in machines is destructive and wasteful. It causes the moving parts to wear and _____produces heat where _____is not wanted. Engineers reduce friction by using very highly polished materials and by lubricating _____surfaces with oil and grease. _____also use ball bearings and roller bearings because rolling objects cause less friction than sliding ____.

1st MID-TERM EXAM (sample)

NAME_____ DATE_____

1. Answer the following questions.

1. Name the main branches of engineering.

_____

_____

/4

2. What is engineering?

_____

_____

/3

3. What historic inventions were fundamental for the development of engineering?

_____

_____

/3

4. Describe property and uses of Aluminium.

Property:_____

Uses: _____

/4

2. Fill in the gaps in the text.

At the University Centre for Professional Studies in Split _____ can study mechanical _____. The college course _____ for three years. Most students study _____, but those who work can take _____courses. At the end of their _____, students will obtain a _____ in mechanical engineering. Having a mechanical engineering

background _____a good opportunity for young engineers to _____a job in different _____of engineering.

/10

3. Link these sentences by using *because, since, as, therefore, so, but:*

1. Nylon is used for bearings. It is self-lubricating.

_____

2. ABS has high impact strength. It is used for safety helmets.

_____

3. Friction is essential in brakes. Friction is a nuisance in an engine.

_____

/3

4. Translate the following:

1. Otporan na kemijske utjecaje_____
2. Krhak_____
3. Krut_____
4. Kovak_____
5. Rastezljiv_____

/5

TOTAL__/32

4. COMPUTERS IN ENGINEERING

Introduction

Unit 4 looks at two aspects of the use of computers relevant to engineering students: computerization of manufacturing and computer use in education.

Lesson aims

- Identify topic development within a paragraph
- Use the Internet effectively
- Evaluate research results
- Report research findings
- Learn abbreviations and acronyms

Warm up

Look at the picture below at basic hardware components

Task 1.

Find two groups of words: the words or phrases that relate to computers and the Internet and those that relate to books and libraries. Now find pairs of words with similar meaning, one from each group.

books browse/search catalogue close cross-reference database electronic resources log in/log on look up menu open page search engine table of contents web page World Wide Web exit/log off hyperlink index library

Please note that *log in* and *log on* are used a little differently. *Log in* is used when accessing a closed system such as Moodle. The related noun has now become one word (*login*). *Log on* is used for open systems such as the Internet. The opposite of *log in* is *log out* and the opposite of *log on* is *log off*.

Task 2.

Complete the text.

Learning Resource Centre

If you want to access web pages on the _____, you must first_____ to the university Intranet with your username and password. You can use any_____, but the default is Google. _____ for web pages by typing one or more keywords in the search box and clicking on Search, or pressing Enter. When the results appear, click on a _____ (highlighted in blue) to go to the web page. Click on Back to return to the results listing.

You can also use the university _____ of learning resources. Click on Engineering Resources on the main_____.

ACRONYMS AND ABBREVIATIONS

Acronyms are pronounced as words: (PIN=/pin/), while abbreviations, which are shorter versions for something, are pronounced as letters (HTTP= H-T-T-P). Abbreviations can sometimes be longer than the words they abbreviate! For example, World Wide Web is three syllables, whereas WWW is six. It evolved because it is quicker to write, but it is longer and harder to say.

It is also possible to mix acronyms with abbreviation: for example, JPEG – J/peg/. ICT is developing at an incredible speed and new acronyms and abbreviations are constantly being created.

Task 3.
Divide the following abbreviations and acronyms into two groups:

CAD CAL CAM DVD HTML HTTP ISP LCD PIN ROM URL USB WAN WWW

Task 4.
A suffix sometimes changes the part of speech of the word.
Study the nouns in the box. Make a verb from each noun. Make another noun from the verb.

Class computer digit identify machine

Reading
Computer Integrated Manufacturing (CIM), page 33 of the course book

Before reading

1. How are computers used in manufacturing today?
2. How has their use changed over the last 50 years?
3. How can computers help reduce the cost of productions?
4. Look at the title of the text and guess what the text will be about.
5. Write some questions that you would like the text to answer.
6. Study the figures 1 and 2 on page 33.
7. What is the structure of the text?
8. What do you think each paragraph will be about?

Watch the video about using CIM at:
https://www.youtube.com/watch?v=c1j6PJu2xy0

During reading

Read the text and check your predictions.
Answer the following questions:
What exactly is CIM?
How are CIM and CAM different?
Why don't all manufacturing companies use CIM?

After reading

Does the topic sentence develop in each paragraph? Underline the word or words which introduce the change.

Developing the topic

A paragraph is normally about the same basic topic (the "unity principle"). However, within a paragraph, ideas often develop beyond the initial comment. This development is often shown by:

A discourse marker: but, however, etc.

A stance marker: unfortunately, etc.

Discourse markers generally make a connection between the previous information and what comes next. They mainly introduce contrasts or additional information.

Stance markers show the attitude of the writer to the information, i.e., whether he/she is surprised, pleased, unhappy, etc. about the information.

EXTENDING SKILLS

Writing: ***Ways of linking ideas, 2***

Previously we learnt that to make our writing effective, we have to make sure our readers can follow our ideas. We learnt how to mark reasons, results, and contrasts in our writing. What are the links between these ideas? What words can we use to mark the links?

1. The accident happened.
2. The operator's carelessness.
3. The supervisor was not present.

Sentence 2 is *a* ***reason*** for sentence 1. Sentence 3 is an ***additional*** **reason**. We can mark the links between them like this:

The accident happened ***because of*** *the operator's carelessness.*

In addition/moreover, *the supervisor was not present.*

We use *because of* to introduce a reason which is a noun or noun phrase. We use *in addition* and *moreover* to introduce an additional reason.

What are the links between these ideas? What words can we use as links?

4. Suitable protection should be worn.
5. Safety helmets should be used where there is a danger of falling objects.

Sentence 5 is an example to illustrate sentence 4. We can mark this in this way.

Suitable protection should be worn. ***For example/For instance,*** *helmets should be used where there is a danger of* falling objects.

Language skills
THE PASSIVE

Passive - Use

1. When the agent of the action is unknown:

My wallet **was stolen** last night. (We don't know who stole the wallet)

2. When the agent is unimportant:

The new students' centre **was completed** last week. (The people who built the centre are unnecessary information for the meaning of the sentence)

3. When the agent of the action is obvious from the context:

I **was born** in March of '55. (Everyone knows that it was my mother bore me then.)

4. To emphasize (put importance on) the recipient (receiver) of the action:

a. Only Jane **was injured** in the accident; the remainder of the passengers were unhurt. (We want Jane to be the subject of the sentence and at the beginning to emphasize her importance.)

b. Erina **was chosen** as best student, and of course this made her happy. (The **teacher** who chose Erina is not what we want to emphasize.) **5.** To connect ideas in different clauses more clearly:

a. Pharmacologists would like to study the natural 'pharmacy' known as the rainforest, if this **can be done** before clear-cutting destroys it. (In this sentence, keeping THIS near the first clause makes the sentence's meaning clearer)

6. To make generic statements, announcements, and explanations:

a. Something **should be done** about the traffic jams in this town.

b. Patrons **are asked** not to smoke.

Passive voice is often used in technical or scientific writing because of its „objectivity" and avoiding of the first person. However, active constructions are also used.

Example:
Heart disease is considered the leading cause of death in the United States. (passive) or
Research points to heart disease as the leading cause of death in the United States.(active)

Form

to be + **past participle**

- object of the "active" sentence becomes subject in the "passive" sentence
- subject of the "active" sentence becomes "object" in the "passive" sentence" (or is left out)

Active:	**Peter**	**builds**	**a house.**
Passive:	**A house**	**is built**	**by Peter.**

Examples

Active	**Peter**	**builds**	**a house.**	Simple Present
Passive:	**A house**	**is built**	**by Peter.**	

Active:	**Peter**	**built**	**a house.**	Simple Past
Passive:	**A house**	**was built**	**by Peter.**	

Active:	**Peter**	**has built**	**a house.**	Present Perfect
Passive:	**A house**	**has been built**	**by Peter.**	

Active:	**Peter**	**will build**	**a house.**	will-future
Passive:	**A house**	**will be built**	**by Peter.**	

Active:	**Peter**	**can build**	**a house.**	Modals
Passive:	**A house**	**can be built**	**by Peter.**	

Task 5.
Replace the sentences using the present passive.

1. Place a block of wood on a flat surface.

   _____

2. Attach a spring balance to one end of the block.

   _____

3. Apply a gradually increasing force to the balance.

   _____

4. Note the force at which the block just begins to move.

   _____

5. Pull the block along so that it moves at a steady speed.

   _____

6. Note the force required to maintain movement.

   _____

7. Compare the two forces.

   _____

5. FRICTION

Introduction

Unit 5 deals with the theme of friction. It focuses on the useful and detrimental characteristics of friction, which are central to the design process in mechanical engineering. The reading text discusses considerations of friction in mechanical engineering design, and how it can be utilized and minimized as appropriate to different machines.

Lesson aims

- Paraphrase at sentence level using passives, synonyms, negatives, replacement subjects
- Further practice in affixes
- Learning word sets: synonyms and antonyms
- Read graphs

Warm up

Watching the video *Friction Introduction* at:
https://www.youtube.com/watch?v=GdIfkPFLaoA

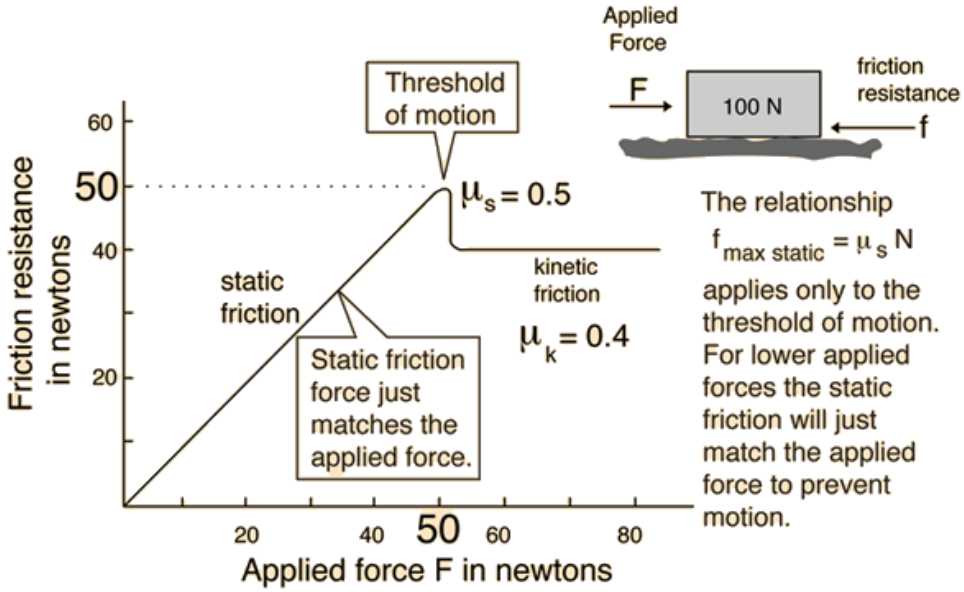
Learning how to read formulas shown in the video: e.g.

Two kinds of friction:

static (stationary) and kinetic (moving)
tires in good contact with road are *static.*

Two coefficients of friction (μ): $\mu_s > \mu_k$

$$F_{f,static,\max} = \mu_s F_N \qquad F_{f,kinetic} = \mu_k F_N$$

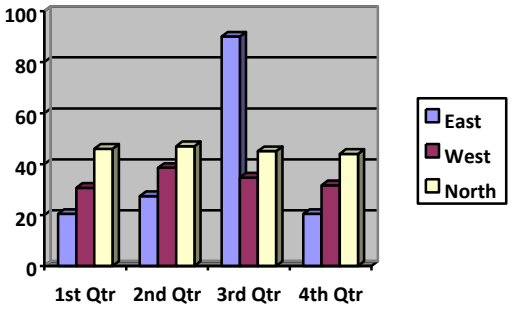


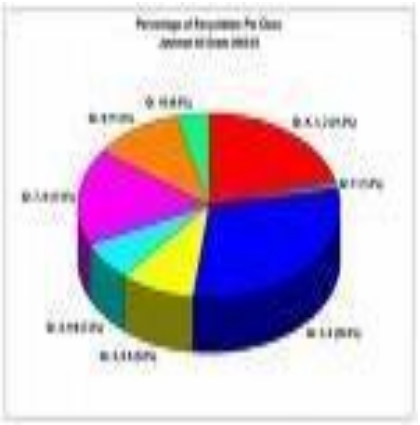
EXTENDING SKILLS

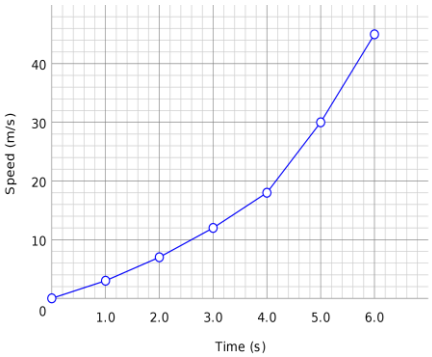
Revision of words used for describing graphs:

Task 1 Label the following graphic displays with the correct term from this list:

Line chart pie chart bar chart







Describing trends

We can describe trends in different ways.

1. By using **verbs of change**: to rise, to decline to double, to rocket, to plummet, to halve… E.g. The load rises sharply.
2. By using **prepositions**: to, from, by, of, at E.g. The load rose from 1 to 3.
3. By using **nouns:** an increase, a drop, a fall, a decline…
   E.g. There is a considerable increase of static friction in this graph.
4. By using **adjectives and adverbs**: steadily, gradually, fast, suddenly…
   E.g. The maximum static friction is significantly higher than kinetic friction.

Direction	**Verb**	**Noun**
Up	climb	climb
	rise	rise
	increase	increase
	rocket	rocket
	jump	jump
Down	decrease	decrease
	dip	dip
	drop	drop
	fall	fall
	plummet	plummet
Level	remain constant	
	level off	levelling off

Adjective	**Adverb**
slight	slightly
gradual	gradually
steady	steadily
steep	steeply
sharp	sharply
sudden	suddenly

Task 2.

Match the words in the box with a meaning from the column.

kinetic/dynamic maximum applied value friction in contact magnitude ratio resistance coefficient force static

rubbing against	
amount	
touching	
not moving	
moving	
size	
push/pull	
used	
relationship	
greatest	
movement against	
measurement	

Task 3.
Complete the text below with the words from the box in the previous task.

Coefficient of friction

The coefficient of friction, μ, is a scalar _____. It is the_____ between the normal force, *N*, of one object on another and the force of resistance, *R*. This ratio differs according to the materials _____. A rubber tire on a road has a high _____, whereas a piston inside a cylinder has a low one. There are two basic kinds of _____.

Static Friction: μ_s

Static friction is what makes stationary objects difficult to move. The direction of this force is along the contact surface and it is equal and opposite to the _____ force. The magnitude of the _____ friction force is given by $f_s = \mu_s N$, where μ is the coefficient of friction and *N* is the normal _____.

Kinetic Friction: μ_k

Kinetic (or _____) friction is created by movement. The direction of this force is opposite to the direction of motion of the object. The_____ of the kinetic friction force is given by $f_k = \mu_k N$. The kinetic friction force is less than the _____ static friction force.

Task 4.
Study the diagram 1 on page 47 of the course book and try to describe what happens at each stage to:

- Applied force?
- Static force?
- Kinetic friction?

Now look at figure 2 on page 47 and write six sentences to describe and compare the coefficients of friction shown.

Reading *Friction: blessing and curse,* page 49

Before reading

Discuss the questions

1. What exactly is friction?
2. How might friction affect the design of a machine?
3. When would friction inside a machine be useful? When is it undesirable?
4. Look at the photographs on page 48, then the title, the introduction and the first sentence of each paragraph on page 49.

   What will the text be about? Write some research questions.

During reading

Read the text. Does it answer your questions?

After reading

Study the highlighted sentences in the text. Find and underline the subject, verb and object or complement in each sentence.

Language skills:

Finding the main information by identifying the parts of a long sentence

Sentences in academic and technical texts are often very long. You often don't have to understand every word, but you must identify the subject, the verb and the object, if there is one, in order to understand the sentence as a whole

e.g.

Before being pumped through the relevant parts of the engine, the lubricating oil must be passed through a disposable filter made of paper or synthetic materials in order to remove dirt which would otherwise create friction and cause wear to components. **Subjec**t = oil

Verb = must be passed through

Object = in order to remove dirt…

Remember!

You can remove any leading prepositional phrases at this point to help you to find the subject: e.g. Before being pumped…

You must then find **the main words** which modify the subject, the verb, and the object or complement.

In the sentence above, we find:

What kind of oil? = the lubricating (oil)

What kind of filter? = disposable, made of paper or synthetic materials

Why? = in order to remove dirt

PARAPHRASING AND REPORTING FINDINGS

You cannot use another writer's words unless you directly quote. Instead you must restate or **paraphrase.**

There are several ways to do this:

Use a synonym of a word or a phrase	Maximum→ peak value for maximum static friction →the peak value for static friction
Change negative to positive and vice versa	Is higher than →is not as high as
Use a replacement subject	Static friction increases →there is a rise in static friction
Change from active to passive and vice versa	The horizontal axis shows applied force→ the value of applied force is shown by the horizontal axis
Change the order of information	Static friction rises as applied force increases→ during application of an external force, there is a rise in static friction

When reporting findings from one source, you should use all the methods above. e.g.

Original text	*At the point of motion, friction force has a maximum value.*
Report	*The peak value of friction force is not reached until movement is initiated.*

Important!
When paraphrasing, you should aim to make sure that 90% of the words you use are different from the original. It is not enough to change only a few vocabulary items: this will result in plagiarism. A paraphrase should only be used in conjunction with a clear acknowledgement of the source. **e.g.**

Original text	*Kinetic friction is constant as applied force increases.*
Plagiarism	*Kinetic friction remains constant as the applied force is increased.*

Task 4.
Write a paraphrase of one part of the text on page 49.

6. ENGINEERING AND SUSTAINABILITY

Introduction

Unit 6 looks at the concept of sustainability and the extent to which engineering holds the key to future sustainable development. The reading text focuses on the challenges to engineering, with particular regard to energy, materials and waste.

Lesson aims

- Further practice with paraphrasing at sentence level using passives, synonyms, negatives, replacement subjects
- Expanding notes into complex sentences
- Writing essays

Warm up

Task 1.
Discuss the following question in pairs.
What is meant by sustainability with regard to engineering design and development?

Sustainable - adjective

- able to be used without being completely used up or destroyed
- involving methods that do not completely use up or destroy natural resources
- able to last or continue for a long time

Sustainability – noun

- the ability to be sustained, supported, upheld, or confirmed.
- Environmental Science. the quality of not being harmful to the environment or depleting natural resources, and thereby supporting long-term ecological balance: e.g.

The committee is developing sustainability standards for products that use energy. With regard to engineering design and development, sustainability would be applied to such things as renewable energy technologies, new materials and processes that have recycling/reuse potential, and the development of more efficient processes that limit or minimize the impacts of human activities on the environment.

Task 2.

Are the products in box sustainable? Why/why not?

Glass oil plastic solar energy

Task 3.

Look at the diagram below and diagrams on page 63. Explain them to your partner. Which stages of the product life cycle does the diagram below represent?

Task 4.

Study the two lists of verbs in box and match the verbs with similar meanings. Then make verbs from nouns if possible.

1	2
Care for	Satisfy
Consider	Mean
Define	Utilize
Exploit	Protect
Imply	Explain
Lead (to)	Think about
Meet	Cut
Reduce	Concern
Relate (to)	Result (in)
Use	Take advantage of

Task 5.

Look at the Hadford University handout.

How does the writer restate each section heading in the paragraph?

Find synonyms for the underlined words. Use a dictionary if necessary.

Rewrite each sentence to make paraphrases of the texts. Use:

- Synonyms you have found yourself
- Synonyms and nouns from previous exercises
- Passives where possible
- Any other words that are necessary

Concepts in engineering and sustainability

a) Sustainability

The word sustainability can be difficult to define. Broadly, it means using the Earth's natural resources responsibly, to meet current and future needs without harming the environment. This is a difficult undertaking, since many of our resources are finite. It therefore implies enormous changes in how we use these resources and care for the environment.

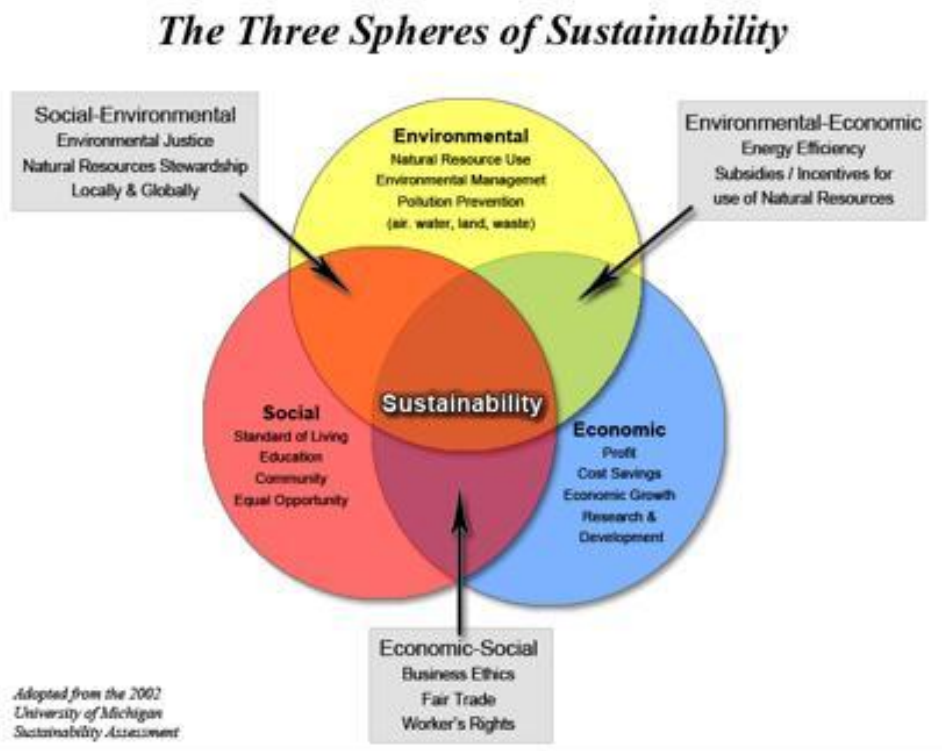
b) Sustainable development

Sustainable development means considering environmental and social factors, as well as financial ones. Many problems of unsustainable growth relate to the products engineers have

designed and produced. Engineers therefore have a key role to play in the areas of energy use, materials, waste and water. They are now developing renewable energy technologies to reduce greenhouse gas emissions which lead to climate change. They are also redesigning products to reduce waste by exploiting the potential of recycled materials.

6. Study the diagram below.

The sustainability system is a collection of interconnected systems. What are the three main spheres of sustainability and how are they connected?



Reading

The Environmental, Economic, and Social Components of Sustainability

It seems like every other day we hear someone talk about sustainability. Sustainability can be broadly defined as ***"meeting the needs of the present generation without compromising the ability of future generations to meet their own needs"***. When it comes to describing sustainability in our world, we need to be concerned about three main areas of influence. There are three interconnected spheres of sustainability that describe the relationships between the environmental, economic, and social aspects of our world. These spheres are a related set of concepts that, when taken together, can form a solid ground from which major decisions and actions can be made. Examples of such decisions could include land use planning, surface water management, building design and construction, and even law making.

When the concepts contained in the three spheres of sustainability are applied to real world situations, everybody wins. Natural resources are preserved, the environment is protected, the economy isn't harmed, and the quality of life for our people is improved or maintained. Below is a diagram showing the three spheres and how they are related.

Basically what this is saying is that nearly everything we do or plan to do, has an effect on the sustainability of the human race.

Environmental Sustainability

In a truly sustainable environment, an ecosystem would maintain populations, biodiversity, and overall functionality over an extended period of time. Ideally, decisions that are made should promote equilibrium within our natural systems and seek to encourage positive growth. Unnecessary disturbances to the environment should be avoided whenever possible. If there is a disturbance, it should be mitigated to the maximum practicable extent. When decisions are made, one part of the discussion should always be the environmental impacts of the proposed outcome or result.

There are several items that are directly related to environmental sustainability. One of the concepts that is of the utmost importance is the proper management of our natural resources. Our aim should be to minimize our impacts to the environment and find solutions to promote habitat restoration and preservation as means to negotiate a successful solution to the problem.

Economic Sustainability is a balancing act. Profitability and cost of a decision must be balanced with the environmental and social impacts of its results.

Economic Sustainability

Similar to environmental sustainability, economic sustainability involves creating economic value out of whatever project or decision you are undertaking. Economic sustainability means that decisions are made in the most equitable and fiscally sound way possible while considering the other aspects of sustainability. In most cases, projects and decisions must be made with the long term benefits in mind (rather than just the short term benefits). Keep in mind that when only the economic aspects of something are considered, it may not necessarily promote true sustainability.

For many people in the business world, economic sustainability or growth their main focal point. On the large scale (globally or even locally), this narrow-minded approach to management of a

business can ultimately lead to unsatisfactory results. However, when good business practices are combined with the social and environmental aspects of sustainability, you can still have a positive result that is for the greater good of humanity.

There are several key ideas that make up economic sustainability. For example, governments should look to promoting "smart growth" through no-nonsense land use planning and subsidies or tax breaks for green development. Strong financial support for universities, education programs, and research & development is an important part of economic sustainability as well. In addition to this, an emphasis should also be placed on other areas such as reducing unnecessary spending and cutting red tape[1].

Social Sustainability

Social sustainability is based on the concept that a decision or project promotes the betterment of society. In general, future generations should have the same or greater quality of life benefits as the current generation do. This concept also encompasses many things such as human rights, environmental law, and public involvement & participation. Failing to put emphasis on the social part of decision or action can result in the slow collapse of the spheres of sustainability (and society as well).

Final Thoughts

For many people, the main concern in their lives is their overall well being and quality of life. Think about how this relates to the economy and the environment. In a poor economy, people experience a poor quality of life. The same also holds true for a poor environment. In a poor environment, the impacts on quality of life are not always easily observable. However, it doesn't take a trained individual to see how things such as polluted stormwater runoff, overdevelopment of floodplains, and the poor management of our scarce resources can have an affect on our everyday quality of life. The three spheres of sustainability encompass many concepts which explain how decisions and actions can have an impact on the overall sustainability of our world.

Adapted from: http://hubpages.com/politics/The-Environmental-Economic-and-Social-Components-of-Sustainability

[1] To cut red tape- an idiom meaning to reduce excessive bureaucratic rules and procedures

Task 1.

Written assignment

1. Using your own words, make notes from the text for your writing assignment.
2. Make complete sentences from these notes and put them in the best order.
3. Write a descriptive summary of the text. Make sure to include the factors mentioned in the three sustainability spheres.

EXTENDING SKILLS

Choosing the correct writing plan

The following types of writing are commonly used in technical and research reports in engineering fields:

Descriptive

Analytical

Comparison

Problem-solution

When you are given a written assignment, you must decide on the best writing plan before you begin to write the outline.

Type of writing assignment-content	Possible structure
Descriptive writing List **the most important points** of something: e.g., a description of key ideas in a theory or from an article you have read; a description of a process or procedure; a description on how something works. Summarize points in logical order. Example*: Describe the factors involved in sustainable development*	**Introduction** **Point/event 1/step 1** **Point/event 2/ step 2** **Point /event 3/ step 3** **Conclusion**
Analytical writing List **the most important points** which **in your opinion** explain the situation. Justify your opinion in each case. Look behind the facts at the **how** and **why**, not just **what/who/when/where**[1].	**Introduction** **Definitions** **Most important points** **Example/evidence/reason 1,** **Example/evidence/reason 2, etc.**

[1] The 5W1H (5 Ws and 1 H) are questions whose answers are considered basic in information-gathering as they cannot be answered with simple „yes/no“answer.

Look for and question accepted ideas and assumptions. Example: *Explain why the current energy use is unsustainable.*	**Next point:** **Example/evidence/reason 3,** **Example/evidence/reason 4,** **Conclusion**
Comparison/evaluation Decide on and define the **aspects** to compare two subjects. You may use these aspects as the basis for paragraphing. Evaluate which aspect(s) is/are better or preferable and give reasons/criteria for your judgement. Example: *Compare and contrast two important renewable energy sources.*	**Introduction** **State and define aspects** Either **Aspect 1:** subject A v B **Aspect 2:** subject A v B Or **Subject A:** aspect 1, 2, etc. **Subject B:** aspect 1, 2, etc. **Conclusion/evaluation**
Problem-solution Describe/explain a current situation: provide background information about the problem(s). Describe/discuss each problem and state **why** it is a problem (as consequence of the situation); effects of problem. Propose solution(s). Summarize; evaluate solutions (explain both positive and negative aspects of each solution, if applicable); draw a conclusions or make a prediction based on your suggestions. Example: *What are the current obstacles to sustainability with regard to engineering design and production, and how can they be overcome?*	**Introduction, state situation, define terms, writing assignment aims** **Point 1:** problem 1 **Point 2:** proposed solution(s) **Point 3:** problem 2 **Point 4:** proposed solution(s), etc. **Conclusion/evaluation** Alternatively: **Introduction: state situation, define terms, writing assignment aims** **Point 1:** problem 1 **Point 2:** problem 2 **Point 3:** proposed solution(s) **Point 4:** proposed solution(s) **Conclusion/evaluation**

Task 2.
Read the text on page 65 *A Sustainable Future - The Challenge for Engineering*

Choose one of the assignment questions below. Write four research questions which will help you to find information for your writing assignment.

Write an essay on the chosen topic.

1. What are the current obstacles to sustainability with regard to engineering design and production, and how can they be overcome?
2. Explain why future development needs to be sustainable.
3. Describe the factors that engineers should - but often don't - consider in a project if it is to be approached holistically.
4. Compare and contrast current, unsustainable methods of energy production and use with more sustainable options, such as renewable energy.

2ND MID-TERM EXAM (sample)

Name: _____ Date: _____

SECTION 1: VOCABULARY

1. Complete the sentences. Write the correct form of words from the box in the spaces. You don't need all the words.

collect / control / strengthen / attach / install / protect / deliver / process / reflect / monitor

1. The roof of the tunnel is falling in. We need to _____ it using concrete beams.
2. This conveyor belt _____ all the pieces of rock and carries them out of the tunnel.
3. The electricians are planning to _____ a new wiring system in the factory.
4. The boxes are _____ to the warehouse by truck, and then taken to shelves by forklift.
5. All the ladders on this site have hooks. The hooks are _____ to the tops of the ladders.
6. The giant mirrors in space will _____ light from the Sun to the Earth at night.
7. You must wear your safety helmet at all times to _____ your head from injury.
8. The police in the helicopter are _____ the crowd of 10,000 football fans.

/8

2. Translate the following:

1. to solder
2. to attach
3. to wire
4. to glue
5. to wire
6. to rivet
7. to braze
8. to bond

/8

3. Put the following acronyms and abbreviations in the corresponding table:

WWW, DVD, HTML, HTTP, LCD, PIN

ACRONYMS	ABBREVIATIONS

/6

SECTION 2: GRAMMAR

Replace the sentences using the passive.

1. The workers completed a new tunnel last week.
2. Education can reduce accidents.
3. Eye injuries can be serious so one must wear goggles for grinding and cutting.
4. People talk about sustainability quite often.
5. There are three interconnected areas of sustainability.
6. Today robots paint and assemble most cars.
7. Cold water flows to the water pump, which then pumps the water into the engine.

/7

Write the correct form of the verb in brackets.

1. Today many skyscrapers in Japan _____ (build) using flexible concrete to resist earthquakes.
2. The water in the radiator is cooled by the fan, which _____ (drive) by the engine.
3. A detailed investigation _____ (carry out) after every accident or near miss which takes place in or near airports.

/3

SECTION 3: READING

These phrases are missing from description of the fire extinguisher. Decide where they fit. Write a letter *(A – J)* in each space.

A high pressure
B up the siphon and out through the nozzle
C the compressed fluid from escaping
D to aim it directly at the fuel
E be used on electrical fires
F the spring-mounted valve move down
G conduct the current
H press down the operating lever at the top of the cylinder
I from flowing into the nozzle from the siphon
J which strikes the gas cylinder and breaks it open

Water-based fire extinguisher

The fire extinguisher is a strong metal cylinder which is filled with water. A plastic siphon tube leads from the bottom of the cylinder to the nozzle at top of the extinguisher. A spring-mounted valve prevents water (1)_____.

At the top of the cylinder, there is a smaller cylinder which is filled with compressed liquid carbon dioxide. A release valve stops (2)_____.

To use the extinguisher, you pull out the safety pin and (3)_____. The lever pushes on an activating rod, which makes (4)_____ . This opens up the passage to the nozzle. The bottom of the activating rod has a sharp point, (5)_____. The compressed gas escapes and pushes down the water in the main cylinder with (6)_____. This drives the water (7)_____ with great force.

The correct way to use the extinguisher is (8)_____ (not at the flames themselves) and to move the stream of water from side to side.

A water extinguisher can put out things like burning wood, paper or cardboard, but it must not (9)_____. In an electrical fire, the water may (10)_____, which can electrocute you.

/10
/42

A list of topics for students' presentations from *Greatest Engineering Achievements of the 20th century*, at: http://www.greatachievements.org/
1. Electrification
2. Automobile
3. Airplane
4. Water Supply and Distribution
5. Radio and television
6. Agricultural Mechanization
7. Laser and fiber optics
8. Computers
9. Air conditioning and refrigeration
10. High performance materials

Appendix 1

Table of English Tenses

	Explanation	Past	Present	Future
		Simple Past	**Simple Present**	**Future I Simple**
Moment	action that takes place once, never or several times	He played football every Tuesday.	He plays football every Tuesday.	He will / is going to play football every Tuesday.
Moment	actions that happen one after another	He played football and then he went home.	He plays football and then he goes home.	He will play football and then he will go home.
Moment	state	He loved football.	He loves football.	He will love football.
		Past Progressive (Continuous)	**Present Progressive (Continuous)**	**Future I Progressive (Continuous)**
Period	action going on at that moment	He was playing football.	He is playing football.	He will be playing football.
Period	actions taking place at the same time	He was playing football and she was watching.	He is playing football and she is watching.	He will be playing football and she will be watching.
		Past Perfect Simple	**Present Perfect Simple**	**Future II Simple**
Result	action taking place before a certain moment in time; emphasizes the result	He had won five matches until that day.	He has won five matches so far.	He will have won five matches by then.
		Past Perfect Progressive (Continuous)	**Present Perfect Progressive (Continuous)**	**Future II Progressive (Continuous)**
Duration	action taking place before a certain moment in time (and beyond), emphasizes the duration	He had been playing football for ten years.	He has been playing football for ten years.	He will have been playing football for ten years.

Grammar review, exercises

Fill the gaps with the correct tenses.

1. The London Dungeon (lie) _____in the oldest part of London - in an old subterranean prison (that's what the word Dungeon (stand) _____for).
2. The museum (take) _____its visitors on a journey through England's bloody history.
3. It (demonstrate) _____the brutal killings and tortures of the past.
4. You (experience / can) _____for example how people (die) _____on the Gallows or during the Plague of 1665.
5. The Dungeon also (show) _____scenes of Jack the Ripper or the beheading of Anne Boleyn, who (be) _____one of Henry VIII's six wives.
6. The atmosphere at the Dungeon (be) _____really scary - nothing for the faint-hearted.
7. While you (walk) _____around the Dungeon, watch out for creepy creatures - the Dungeon (employ) _____actors to give its visitors the fright of their lives.
8. The actors dressed as monsters, ghosts or executers, (hide) _____in the dark corners of the Dungeon and then suddenly (jump) _____out and (grab) _____one of the visitors.
9. And the horror (end / not) _____at the exit of the exhibition.
10. (you / eat / ever) _____a pizza with fingers and eyeballs on it?
11. Well, if you (fancy) _____that kind of food, you (love) _____the meals at the Dungeon restaurant.
12. The museum (want) _____to provoke shock, educate and delight.
13. And this it (do) _____extremely well.
14. Since its opening in 1975, the Dungeon (attract) _____many visitors from all over the world.
15. Besides the regular opening hours, the Dungeon sometimes also (open) _____at night.
16. If you (have) _____enough money and nerves of steel, you (book / can) _____the Dungeon for parties, conferences or charity events at night.
17. And on 31 October, a frightfully good Halloween Party (take place) _____at the Dungeon every year.

Fill the gaps with the correct tenses.

1. I (learn) _____English for seven years now.
2. But last year I (not / work) _____hard enough for English, that's why my marks (not / be) _____really that good then.
3. As I (pass / want) _____my English exam successfully next year, I (study) _____harder this term.
4. During my last summer holidays, my parents (send) _____me on a language course to London.
5. It (be) _____great and I (think) _____I learn) _____a lot.
6. Before I (go) _____to London, I (not / enjoy) _____learning English.
7. But while I (do) _____the language course, I (meet) _____lots of young people from all over the world.
8. There I (notice) _____how important it (be) _____to speak foreign languages nowadays.
9. Now I (have) _____much more fun learning English than I (have) _____before the course.
10. At the moment I (revise) _____English grammar.
11. And I (begin / already) _____to read the texts in my English textbooks again.
12. I (think) _____I (do) _____one unit every week.
13. My exam (be) _____on 15 May, so there (not / be) _____any time to be lost.
14. If I (pass) _____my exams successfully, I (start) _____an apprenticeship in September.
15. And after my apprenticeship, maybe I (go) _____back to London to work there for a while.
16. As you (see / can) _____, I (become) _____a real London fan already.

Appendix 2

Mathematical expressions and other symbols

+	plus/and/positive	How much is seven plus three?
_	minus/take away/ negative	How much is seven minus three?
x	times/ is multiplied by	Three times two equals six.
:	is divided by	Nine divided by three equals three.
=	is/equals/is equal to/is the same as	
%	percent	
<	is less than	
>	is more/greater than/is over	
$\frac{1}{2}$	one half; $\frac{5}{2}$ five halves; $\frac{1}{3}$ one third	
$\frac{a}{b}$ *or* a/b	a divided by b or a over b	
.	decimal point	
0.25	nought/zero point two five;	17.38 seventeen point three eight per cent
17,537	seventeen thousand, five hundred and thirty-seven	
$\sqrt{}$	square root	

$\sqrt[3]{}$	cube root
x^2	x squared
x^3	x cubed
x^5	x to the power of five
x^{-5}	x to the power of minus five
x_n	x sub n; x subscript n
n!	n factorial
$\int$	the integral of
In computing	
A/B	A slash B
A\B	A backslash B
B_C	B underscore C
C-D	C hyphen (or dash) D
D: E	D colon E
Internet symbols	
@	at
.com	dot com

Abbreviations
Length
mm millimetre(s)
cm centimentre(s)
m metre(s)
Area
m^2 square metre(s)
km^2 square kilometre(s)
Mass/Weight
mg milligram(s)
g gram(s)
kg kilogram(s)
Time
s second
min minute
h hour

Appendix 3

Safety

Safety symbols

General warnings/ danger/caution/hazard (usually triangular)

Toxic

Safety equipment or help: emergency exit/ first aid / fire alarm/ fire extinguisher...

Flammability warnings:

(Highly) flammable

Prohibition signs:

Language skills
Making safety rules

We can make safety rules in these ways:

1 Using ***imperative.***

Wear *protective clothing.*

Do not wear *loose-fitting clothing.*

2 ***Always/never*** are used to emphasize that the rule holds in all cases.

Always *wear protective clothing.*

Never *wear loose fitting clothing.*

3 We can use a ***modal verb*** for emphasis.

Protective clothing **must** *be worn.*

Protective clothing ***should*** *be worn.*

Task

Study this list of unsafe environmental conditions (hazards). Write safety rules to limit these hazards using the methods given above. For example:

Inadequate lighting

Lighting must be adequate. or
Lighting should be adequate.

- uneven floors
- unguarded machinery
- untidy workbenches
- untidy workplaces
- badly maintained machinery
- carelessly stored dangerous materials
- inadequate ventilation
- damaged tools and equipment
- machinery in poor condition
- equipment used improperly
- equipment operated by untrained personnel
- apprentices working without supervision

Appendix 4

APPLYING FOR A JOB AND SUBMITTING A CURRICULUM VITAE

A curriculum vitae (CV)/ résumé is a chronological description of your academic, extracurricular and professional achievements.

Writing a CV is an extremely important step when applying for a scholarship or a job. The aim of any CV is to present a candidate's qualifications, skills and abilities in such a way that will interest the selection committee into inviting the candidate for an interview.

Apart from personal information (first and last name, contacts), a CV usually contains the following information:

- Formal and informal education
- Work experience (if applicable and relevant for the application)
- Language and computer skills
- Awards and recognitions
- Published works and papers
- Community work
- Previous scholarships
- Other relevant experience and achievements

The usual length of a CV is:

- 1-3 pages for undergraduate and (post)graduate applications
- 2-5 pages for doctoral studies applications
- 5 or more pages for a research application
- 1-2 pages for a job application

Useful advice

- Make sure your qualifications, skills and abilities are presented in a clear and logical manner
- Check your text for spelling and grammar mistakes
- Concentrate on the important issues: leave out details that you do not consider relevant in your application
- Do not make your CV too long: it needs to be clear and concise
- Tailor your CV to the application/program/job for which you are applying
- Ask someone to read your CV after it is finished

Europass CV

EU CV is a curriculum vitae format used in academic and job applications. The EU CV is officially recommended by the European Commission.

The EU CV is simple to use because it consists of several logical sections.

Here you will find:

- **Instructions for filling in the CV**
  (Source: http://europass.cedefop.eu.int; PDF format, 136 KB, English)
- **Examples of completed CVs**
  (Source: http://europass.cedefop.eu.int; PDF format, 22 KB, English).

The EU CV is one of the five documents that make up the Europass. The Europass is a set of documents that can help you present your skills and qualifications in a way that is easily comparable and recognizable in all of Europe that is if Europe is the destination of your educational program, job search or work experience.

Good resume writing guidelines
(Source: http://www.moj-posao.net; Croatian)
The content of a good resume
(Source: http://www.moj-posao.net; Croatian)
CV writing
(Source: http://www.ceu.hu; English)
CV writing tips
(Source: http://www.cvtips.com; English)
How to write a curriculum vitae
(Source: http://www.eastchance.com; English)

KEY TO EXERCISES

Unit 1

Task 1

Model answer: Engineering is mainly a practical activity. It is about putting ideas into action. It is creative and practical use of science in order to develop, design, construct and use machines, apparatus or processes.

Task 4

Base word is underlined. Prefix precedes the base word and suffix comes after.

Semicircle, expansion, (expand) distortion, telecommunications, subdivision, Package, development, alteration, (alterate) hypersurface, malfunction, Subset, silencer, interference, irreplaceable, semi-circular

Task 5

In an engineering context, you can...

1. tighten or loosen a screw, a bolt, a clamp, vice jaws…	4 widen a bridge, vice jaws, a clamp, an opening…	7 mechanize any tool, a pulley, an assembly line…
2. strengthen a beam, a spar, a bracket, a plate…	5 lengthen a beam, a slot, a connecting rod, a girder…	8 assemble a cutting tool, an axle, a jack…
3 weaken a rivet, a joint, a valve, a rail…	6 engineer any kind of working system…	9 mount a machine, a structure, a drill

Task 7

The main branches of engineering are civil, mechanical, electrical and electronic.
Mechanical engineering is concerned with machinery of all kinds.
This branch of engineering includes marine, automobile, aeronautical engineering and heating and ventilating. The first three are concerned with transport: vessels, cars and planes. The last deals with airconditioning, refrigeration, etc.

Electrical engineering deals with eletricity from generation to use. Electricity generating is concerned with electric stations. Electrical installation deals with cables, switchgear, and connecting up electrical equipment.

Chemical engineering is concerned with the development and manufacture of chemicals.

All engineers utilize science in order to produce a successful result.

Task 8

In the United Kingdom you can study engineering at a college of further education or at a university. Most college courses last from one to two years. University undergraduate courses in engineering normally last from three to four years. A college will take place after four years of secondary school education. Most students study full-time, while day-release courses are available for people who work in local engineering companies. Students will be given a certificate or a diploma at the end of their course.

Most university students will have completed six years of secondary school. Others will have taken a diploma course at college. Universities give degrees. A Bachelor's degree requires three to four years. A Master's degree requires a further year.

Unit 2

Task 1

Word	**Part of speech**	**type**	**Main meaning**	**Technical meaning**
operate	v	T	do a surgical procedure	make a machine work
friction	n	U	bad feeling between people	the result of surfaces rubbing
sealed	adj.		agreed	made airtight or waterproof
shaft	n	C	a long handle on a tool or spear	1. shaft in the ground for mining 2. a way of carrying motive power from engine to, e.g. wheels
code	n	C	a secret code	a set of rules
radiator	n	C		1. a cooler 2. a heater
patent	n	C		the right to earn money from an invention
apparatus	n	U		a piece of equipment
elevator	n	C		a lift
condense	n	T/I	abbreviate	change from gas to liquid
pressure	n	C	stress	the result of compressing something
fluid	n	U	changing	a liquid
device	n	C		a machine

Task 2

Achievement	**Definition**	**Effect**
The automobile	The car	It made it possible for people to get around quickly, to carry goods.
The Apollo missions to the Moon	Sending people to the Moon and bringing them back safely	Engineers learnt a lot about a number of areas from the extreme difficulties they had to overcome
Power generation	Making electricity	The basic power behind many aspects of modern life
Agricultural mechanization	Doing work on farms with machines	Cheaper food
The airplane	Powered flight	Quick travel, but also environmental effects
The mass production of integrated circuits	Making the important parts of electronic equipment- mass production means making millions quickly and cheaply	Cheap electronic equipment leading to mass computerization, home entertainment
Refrigeration and air conditioning	Keeping food and other things including rooms, cold	Food safety, food preservation, health, being able to work in hot ambient temperatures
CAD and CAM	Computer-aided design or manufacture	Better, faster design; manufacture in complex and dangerous situations
Bioengineering	Bioengineering often means biomedical engineering but can also mean food	New drugs, pest-resistant and higher yield crops and now cloning

	engineering and agricultural engineering. It is the application of engineering principles to biological systems and functions	
Codes and standards	Deciding how something should be made or operated for safety	Protection of workers and the general public

Task 4

The students are offered material from http://www.greatachievements.org/ and are given assignments. The instructor gives clear instructions and guidelines on how to give a good presentation. The presentations have to be relevant and interesting, have a clear purpose and be well organized. Also, they need to be easy to understand with clear power-point visuals to support it. The presentations are conducted on set dates throughout the semester. The students either work individually or are placed in pairs with each student presenting maximum 5 minutes (10 minutes total time/pair).

Unit 3

Task 1

Model answers: plywood, steel, plastic, alloys, wood, glass, iron…

Task 2

Materials	**Properties**	**Uses**
Metals		
Aluminium (or Aluminum)	Light, soft, ductile, highly conductive, corrosion-resistant	Aircraft, engine components, foil, cooking utensils
Copper	Very malleable, tough and ductile, highly conductive, corrosion-resistant.	Electric wiring, PCBs, tubing
Brass (65% copper, 35% zinc)	Very corrosion-resistant. Casts well, easily machined. Can be work hardened: good conductor.	Valves, taps, castings, ship fittings, electrical contacts.

Task 3.

Key word	Definition
Stress	The behavior inside a material when a force is applied
Strain	The deformation caused by the stress
Elasticity	The ability to deform and return to its original shape
Plasticity	Permanent deformation after stress; the inability to return to its original shape

Task 4.

1. Copper is highly conductive. Therefore, it is used for electric wiring.
2. Weight is measured in Newtons, while mass is measured in kilograms.
3. Nylon is used for bearings because it is self-lubricating.
4. ABS has high impact strength; therefore it is used for safety-helmets.
5. The foot pump is a class 2 lever as the load is between the effort and the fulcrum.
6. Friction is essential in brakes, but it is a nuisance in an engine.

Task 5.

Friction in machines is destructive and wasteful. It causes the moving parts to wear and *it* produces heat where *it* is not wanted. Engineers reduce friction by using very highly polished materials and by lubricating *their* surfaces with oil and grease. *They* also use ball bearings and roller bearings because rolling objects cause less friction than sliding *ones.*

Unit 4

Task 1.

Books and libraries	**the Internet and electronic information**
Books	Electronic resources
Index	Search engine
Cross-reference	Hyperlink
Catalogue	Database
Library	World wide web
Table of content	Menu
Look up	Browse/search
Page	Web page
Open	Log in/log on
Close	Exit/log off

Task 2.

Learning Resource Centre

If you want to access web pages on the __WWW_____, you must first __log in_____ to the university Intranet with your username and password. You can use any __search engine___, but the default is Google. ___Browse/Search___for web pages by typing one or more keywords in the search box and clicking on Search, or pressing Enter. When the results appear, click on a __hyperlink____ (highlighted in blue) to go to the web page. Click on Back to return to the results listing.

You can also use the university _____database_____ of learning resources. Click on Engineering Resources on the main ____menu_____.

Task 3.

Acronyms:	CAD CAL CAM PIN ROM WAN
Abbreviations:	DVD HTML HTTP ISP LCD URL USB WWW

Task 4.

Noun 1	**Verb**	**Noun 2**
class	classify	classification
computer	computerize	computerization
digit	digitize	digitization
identify	identify	identification
machine	mechanize	mechanization

Task 5

1. A block of wood is placed on a flat surface.
2. A spring is attached to one end of the block.
3. A gradually increasing force is applied to the balance.
4. The force at which the block moves is noted.
5. The block is pulled along so that it moves at a steady speed.
6. The force required to maintain movement is noted.
7. The two forces are compared.

Unit 5

Task 2

rubbing against	friction
amount	value
touching	in contact
not moving	static
moving	kinetic/dynamic
size	magnitude
push/pull	force
used	applied
relationship	ratio
greatest	maximum
movement against	resistance
measurement	coefficient

Task 3

Coefficient of friction

The coefficient of friction, μ (pronounced /mju:/), is a scalar _value__. It is the ratio___ between the normal force, *N*, of one object on another and the force of resistance, *R*. This ratio differs according to the materials __in contact_. A rubber tire on a road has a high ____coefficient___, whereas a piston inside a cylinder has a low one. There are two basic kinds of ____friction.

Static Friction: μ_s

Static friction is what makes stationary objects difficult to move. The direction of this force is along the contact surface and it is equal and opposite to the __applied__force. The magnitude of the ____static__friction force is given by $f_s = \mu_s N$, where μ is the coefficient of friction and *N* is the normal ___force_.

Kinetic Friction: μ_k

Kinetic (or __dynamic__) friction is created by movement. The direction of this force is opposite to the direction of motion of the object. The___magnitude_ of the kinetic friction force is given by $f_k = \mu_k N$. The kinetic friction force is less than the _____maximum____ static friction force.

Unit 6

Task 2

Product	**Sustainable/Unsustainable**	**Reasons**
Glass	Sustainable	All types of glass waste are recyclable and can be recycled indefinitely
Oil	Unsustainable	Oil is a finite material, which cannot be replenished. It is a source of pollution. Oil biodegrades/breaks down in natural environment but it takes a long time.
Plastic	Both	All types of plastic are capable of being recycled but production and use of plastics has environmental impacts: large quantities of finite resources (fossil fuels) are needed as raw material (oil) and as energy for manufacturing. Most plastic products are non-degradable; when disposed of in landfill sites, they will stay around forever.

Solar energy	Sustainable	Renewable A clean fuel technology; no carbon emissions from solar to-fuel technologies. Can be generated domestically. Benefits to economy, environment and society.

Task 4

Verb	**Noun**	**Verb**	**Noun**
Care for	Care	Protect	Protection
Consider	Consideration	Think about	-
Define	Definition	Explain	Explanation
Exploit	Exploitation	Take advantage of	-
Imply	Implication	Mean	Meaning
Lead (to)	-	Result (in)	Result
Meet	-	Satisfy	Satisfaction
Reduce	Reduction	Cut	Cut (a cut in…)
Relate (to)	(in) relation (to)	Concern	-
use	use	Utilize	utilization

References

The main course book:

Dunn, M.; Howey, D.; Ilic A.; Regan, N. (2012) *English for Mechanical Engineering in Higher Education Studies.* Garnet education. Course book

Reading texts:

Engineering adapted from: http://en.wikipedia.org/wiki/Engineering

The Environmental, Economic and Social Components of Sustainability, adapted from:

http://hubpages.com/politics/The-Environmental-Economic-and-Social-Components-ofSustainability

Student presentations:

Materials for student presentations: http://www.greatachievements.org/

Videos:

Intro to engineering: https://www.youtube.com/watch?v=qx9lLiAISAw

An example of good and bad presentation: https://www.youtube.com/watch?v=S5c1susCPAE

Using CIM: https://www.youtube.com/watch?v=c1j6PJu2xy0

Friction Introduction at: https://www.youtube.com/watch?v=GdIfkPFLaoA

KOSANOVIĆ, SILVANA,

TEHNIČKI ENGLESKI JEZIK, E-SKRIPTA

ODJEL ZA STRUČNE STUDIJE, SVEUČILIŠTE U SPLITU, 2016