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ДЕЯТЕЛЬНОСТЬ

ENGLISH
FOR MASTER STUDENTS
INTRODUCTION TO RESEARCH

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Данное учебное пособие предназначено для магистрантов технических направлений. Пособие направлено на развитие умений в чтении, письме, говорении и восприятии иноязычной речи на слух, а также навыков аннотирования и реферирования на материале научных текстов. В рамках учебного пособия рассматриваются темы «История науки», «Область исследования», «Программы магистратуры в НГТУ и за рубежом», «Научная литература» и др. В зависимости от поставленной задачи данное пособие может быть использовано для контактной работы с обучающимися и во время самостоятельной работы магистрантов.

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Contents

INTRODUCTION TO RESEARCH

Unit 1. HISTORY OF SCIENCE	4
Text 1. A Brief History of Science.....	4
Text 2. The Birth of Modern Physics	9
Unit 2. MASTER OF SCIENCE PROGRAM.....	17
Text 1. Master of Science Program at NSTU	18
Text 2. Master of Science in Information and Technology (MSIT) at California Lutheran University	25
Text 3. My Research Work	32
Unit 3. SCIENTIFIC LITERATURE	39
Text 2. Learning about Electronics	44
Text 3. Generation of Electricity	46
Appendix I. Guidelines for Writing a Glossary	48
Appendix II. Useful Language for Writing a Project Summary	49
Appendix III. Scheme-Model of the English Scientific Article	50
Appendix IV. Abstracting and Summarising. Theoretical Review	52
Appendix V. Useful Language for Summarising.....	62
Appendix VI. Means of Connection	65
References.....	67
Audioscript	68

Unit 1

HISTORY OF SCIENCE

Text 1

A Brief History of Science

60-Second Listening

Task 1.1 a) Answer the question: What is the role of science in modern society?

b) Listen to the text about science. What is the role of science according to the text?

Before you Read

Task 1.2 Answer the questions:

1. What is science? What is the purpose of science?
2. Is science a good or a bad thing?
3. How has science changed society? What new inventions could you not live without?

Vocabulary

1. prediction	предсказание
2. inquisitive	любопытный
3. observation	наблюдение
4. Universe	вселенная
5. extraction	добыча, извлечение
6. to treat a disease	лечить болезнь
7. to concentrate on	концентрироваться на чем-либо
8. to suggest	предлагать
9. matter	вещество
10. gunpowder	порох

Task 1.3 Read the words and word combinations and guess their meaning

prehistoric times	chemical process
seasonal changes	metallurgists
position of the sun	herbal medicines
centre of the Universe	pharmaceutical companies
astronomy	synthetic

Task 1.4 Read the text and make notes on the main stages of science development.

Humankind has always been inquisitive, needing to understand why things behave in a certain way, and trying to link observation with prediction. For example, since prehistoric times we have observed the heavens and tried to make sense of the seasonal changes in the position of the sun, moon and stars.

In about 4000 BC, the Mesopotamians tried to explain their observations by suggesting that the Earth was at the centre of the Universe, and that the other heavenly bodies moved around it. Humans have always been interested in the nature and origins of this Universe.

Metallurgy

But they weren't only interested in astronomy. The extraction of iron, which led to the Iron Age, is a chemical process which early metallurgists developed without understanding any of the science involved. Nevertheless, they were still eager to optimise the extraction by trial and error.

Before this, copper and tin were extracted (which led to the Bronze Age) and later, zinc. Exactly how each of these processes was discovered is lost in the mists of time, but it is likely that they were developed using observation and experiment in a similar way to that used by today's scientists.

Medicine

Early humankind also observed that certain plants could be used to treat sickness and disease, and herbal medicines were developed, some of which are still used by modern pharmaceutical companies to provide leads for new synthetic drugs.

The Greeks

The first people to try and develop the theory behind their observations were the Greeks: people such as Pythagoras, who concentrated on a mathe-

mathematical view of the world. Similarly, Aristotle and Plato developed logical methods for examining the world around them.

It was the Greeks who first suggested that matter was made up of atoms - fundamental particles that could not be broken down further. But it wasn't only the Greeks who moved science on. Science was also being developed in India, China, the Middle East and South America. Despite having their own cultural view of the world, they each independently developed materials such as gunpowder, soap and paper.

However, it wasn't until the 13th century that much of this scientific work was brought together in European universities, and that it started to look more like science as we know it today.

Progress was relatively slow at first. For example, it took until the 16th century for Copernicus to revolutionise (literally) the way that we look at the Universe, and for Harvey to put forward his ideas on how blood circulated round the human body. This slow progress was sometimes the result of religious dogma, but it was also a product of troubled times!

The birth of modern science

It was in the 17th century that modern science was really born, and the world began to be examined more closely, using instruments such as the telescope, microscope, clock and barometer. It was also at this time that scientific laws started to be put forward for such phenomena as gravity and the way that the volume, pressure and temperature of a gas are related.

In the 18th century much of basic biology and chemistry was developed as part of the Age of Enlightenment.

The 19th century saw some of the great names of science: people like the chemist John Dalton, who developed the atomic theory of matter, Michael Faraday and James Maxwell who both put forward theories concerning electricity and magnetism, and Charles Darwin, who proposed the controversial theory of evolution. Each of these developments forced scientists radically to re-examine their views of the way in which the world worked.

Developing Academic Vocabulary

Task 1.5 For each word below, read the sentence it occurs in the text above and answer the questions:

observation universe extraction suggest inquisitive

a) Is the word positive, negative or neutral?;

- b) Is it a noun, adjective, adverb or verb?;
- c) Can you think of a word with a similar meaning (synonym) and one with an opposite meaning (antonym)?

Reading Comprehension

Task 1.6 Read the text again and answer the questions.

1. Which ways of studying the world in prehistoric times does the text describe?
2. Who suggested that the Earth was the centre of the Universe?
3. Which factor led to the Iron Age?
4. How did the people cope with the task of extracting iron?
5. Extracting of which metals led to the Bronze Age?
6. What early knowledge of humankind does contemporary medicine imply?
7. What did the Greeks concentrate on?
8. When did science start to shape as it is today?
9. What kinds of inventions did China, the Middle East and America give to the world?
10. When was modern science born?
11. What was developed as part of the Age of Enlightenment in the 18th century?
12. What great scientists of the 19th century are mentioned in the text? What contribution to science did each of them make?

Task 1.7 Complete the sentences

1. Humankind has always been
2. Since prehistoric times people observed
3. The Mesopotamians tried to
4. We do not know much about the process of discovery of ..., but
5. Some of herbal medicines developed by early humans are
6. The Greeks tried to develop
7. They also suggested that
8. However, it was not until the 13th century
9. In the 16th century Copernicus revolutionised
10. The slow process was the result of
11. In the 17th century the world began to be examined more closely, using
12. In the 18th century much of

13. The 19th century saw some of the great ...
14. Each of these developments forced scientists to ...

Task 1.8 Give the English equivalents of the following words and word combinations

1. вести себя определенным образом
2. проявлять любознательность
3. наблюдать за небесными светилами
4. делать попытку объяснить наблюдения
5. природа и происхождение вселенной
6. оптимизировать процесс добычи полезных ископаемых
7. путем проб и ошибок
8. новые синтетические лекарственные средства
9. методы изучения мира
10. иметь собственный культурный взгляд на мир
11. выдвигать идею
12. Эпоха Просвещения
13. предложить теорию
14. заставить пересмотреть свою точку зрения

Task 1.9 Translate into English

1. С древнейших времен человечество проявляло любознательность в отношении явлений окружающего мира и осуществляли наблюдение за небом.

2. Люди осознавали, что небесные светила ведут себя определенным образом и полагали, что наша планета является центром вселенной.

3. Несмотря на то, что процесс добычи полезных ископаемых происходил без использования каких-либо научных данных, людям удалось усовершенствовать и оптимизировать его.

4. Древние знания о свойствах растений используются в современной фармакологической промышленности для производства лекарственных средств.

5. Греки были сконцентрированы на математическом взгляде на мир и развивали различные методы исследования

6. Они также предположили, что вещество состоит из атомов.

7. Прогресс в науке достигался долго в результате главенствования религиозных догм.

Grammar Focus

Relative pronouns *who/that* and *which/that*

Relative pronouns are often used to link two pieces of information in one sentence.

We use *who* and *that* to link information about people:

The 19th century saw some of the great names of science: people like the chemist John Dalton, *who* developed the atomic theory of matter.

We use *which* and *that* to link information about things:

It took until the 16th century for Copernicus to revolutionise (literally) the way *that* we look at the Universe

Task 1.10 Find sentences with relative pronouns in the text above. Explain the choice of *who/that* or *which/that*.

Task 1.11 Complete the sentences with *who/that* or *which/that*.

1. Mesopotamia is an ancient historical region in West Asia _____ was located in the heart of the Tigris-Euphrates river system.

2. The Iron Age was a period in human history _____ started between 1200 B.C. and 600 B.C.

3. Aristotle and Plato were the Greeks _____ developed logical methods for examining the world.

4. The 17th century saw many instruments _____ were used to examine the world more closely.

5. Basic biology and chemistry were the sciences _____ were developed as part of the Age of Enlightenment.

6. It was John Dalton _____ developed the atomic theory of matter.

Speaking

Task 1.12 Speak about the history of science. Use questions in Task 1.6 as a plan.

Text 2

The Birth of Modern Physics

60-Second Listening

Task 2.1 a) Answer the question: What is Physics for you?

b) Listen to the text about physics. What contribution did physicists make to science according to the text?

Before you Read

Task 2.2 Answer the questions:

1. What is physics as a science? What does it deal with?
2. Can you enumerate any physical theories?
3. What physical phenomena do you know?

Vocabulary

- | | |
|--------------------|--|
| 1. boundary | граница |
| 2. to revive | возрождать |
| 3. to validate | подтвердить, обосновать |
| 4. comprehensive | всеобъемлющий |
| 5. equation | уравнение |
| 6. to recede | отступать, удаляться |
| 7. nuclear fission | атомное деление, ядерный распад |
| 8. to recruit | нанимать, привлекать |
| 9. beta decay | бэ́та-распа́д (β-распад) |
| 10. to disprove | опровергнуть |
| 11. parity | паритет, равенство, |
| 12. iconoclastic | иконоборческий, направленный против
предрассудков |

Task 2.3 Read the words and word combinations and guess their meaning

- | | |
|---------------------------|------------------------------|
| scientific revolution | fundamental force of gravity |
| solar system | unification |
| model of planetary motion | phenomenon |
| elliptical orbits | anomalous |
| universal gravitation | atomic bomb |

Task 2.4 Read the text and complete the table below

Period of time (century, year)	Scientist	Contribution to science

The scientific revolution is a convenient boundary between ancient thought and classical physics. Nicolaus Copernicus revived the heliocentric

model of the solar system described by Aristarchus of Samos. This was followed by the first known model of planetary motion given by Johannes Kepler in the early 17th century, which proposed that the planets follow elliptical orbits, with the Sun at one focus of the ellipse. Galileo (“Father of Modern Physics”) also made use of experiments to validate physical theories, a key element of the scientific method. William Gilbert did some of the earliest experiments with electricity and magnetism, establishing that the Earth itself is magnetic.

In 1687, Isaac Newton published the *Principia Mathematica*, detailing two comprehensive and successful physical theories: Newton’s laws of motion, which led to classical mechanics; and Newton’s law of universal gravitation, which describes the fundamental force of gravity.

During the late 18th and early 19th century, the behavior of electricity and magnetism was studied by Luigi Galvani, Giovanni Aldini, Alessandro Volta, Michael Faraday, Georg Ohm, and others. These studies led to the unification of the two phenomena into a single theory of electromagnetism, by James Clerk Maxwell (known as Maxwell’s equations).

The beginning of the 20th century brought the start of a revolution in physics. The long-held theories of Newton were shown not to be correct in all circumstances. Beginning in 1900, Max Planck, Albert Einstein, Niels Bohr and others developed quantum theories to explain various anomalous experimental results, by introducing discrete energy levels. Not only did quantum mechanics show that the laws of motion did not hold on small scales, but the theory of general relativity, proposed by Einstein in 1915, showed that the fixed background of spacetime, on which both Newtonian mechanics and special relativity depended, could not exist. In 1925, Werner Heisenberg and Erwin Schrödinger formulated quantum mechanics, which explained the preceding quantum theories. The observation by Edwin Hubble in 1929 that the speed at which galaxies recede positively correlates with their distance, led to the understanding that the universe is expanding, and the formulation of the Big Bang theory by Georges Lemaître.

In 1938 Otto Hahn and Fritz Strassmann discovered nuclear fission with radiochemical methods, and in 1939 Lise Meitner and Otto Robert Frisch wrote the first theoretical interpretation of the fission process, which was later improved by Niels Bohr and John A. Wheeler. Further developments took place during World War II, which led to the practical application of radar and the development and use of the atomic bomb. Around this time, Chien-Shiung Wu was recruited by the Manhattan Project to help develop a process for separating uranium metal into U-235 and U-238 isotopes by

Gaseous diffusion. She was an expert experimentalist in beta decay and weak interaction physics. Wu designed an experiment that enabled theoretical physicists Tsung-Dao Lee and Chen-Ning Yang to disprove the law of parity experimentally, winning them a Nobel Prize in 1957.

Though the process had begun with the invention of the cyclotron by Ernest O. Lawrence in the 1930s, physics in the postwar period entered into a phase of what historians have called “Big Science”, requiring massive machines, budgets, and laboratories in order to test their theories and move into new frontiers. The primary patron of physics became state governments, who recognized that the support of “basic” research could often lead to technologies useful to both military and industrial applications.

Currently, general relativity and quantum mechanics are inconsistent with each other, and efforts are underway to unify the two.

The last century brought discoveries such as relativity and quantum mechanics, which, again, required scientists to look at things in a completely different way. It makes you wonder what the iconoclastic discoveries of this century will be.

Developing Academic Vocabulary

Task 2.5 For each word below, read the sentence it occurs in the text above and answer the questions:

relativity fission decay require inconsistent

- a) Is the word positive, negative or neutral?;
- b) Is it a noun, adjective, adverb or verb?;
- c) Can you think of a word with a similar meaning (synonym) and one with an opposite meaning (antonym)?

Reading Comprehension

Task 2.6 Answer the questions on the text

- 1. Who proposed the first known model of planetary motion?
- 2. What was William Gilbert’s contribution to physics?
- 3. What did Isaac Newton detail in his Principia Mathematica?
- 4. What did the study of the behavior of electricity and magnetism by Galvani, Faraday, Volta and Ohm lead to?
- 5. Were the long-held theories of Newton shown to be correct in all circumstances?
- 6. What did the quantum theory explain?

7. What observations led to the understanding and formulation of the Big Bang theory?
8. Who discovered nuclear fission with radiochemical methods?
9. What project did Chien-Shiung Wu participate in?
10. Which period is called “Big Science” by the historians?

Task 2.7 Complete the sentences

1. The scientific revolution is a convenient boundary between... .
2. The theory of general relativity, proposed by Einstein in 1915, showed... .
3. The observation by Edwin Hubble in 1929 that the speed at which galaxies recede positively correlates with their distance, led to the understanding that
4. In 1939 Lise Meitner and Otto Robert Frisch wrote the first theoretical interpretation of the fission process, which
5. Chien-Shiung Wu was recruited by
6. Physics in the postwar period entered into
7. Currently, general relativity and quantum mechanics are
8. The last century brought discoveries such as

Task 2.8 Give the English equivalents of the following words and word combinations

1. гелиоцентрическая модель Солнечной системы
2. первая известная модель движения планет
3. удостовериться в правильности теории
4. законы всемирного тяготения
5. объединение двух явлений в единую теорию
6. быть правильным при любых обстоятельствах
7. объяснять аномальные экспериментальные результаты
8. теоретическое описание процесса распада
9. дать возможность опровергнуть результаты эксперимента
10. смотреть на вещи совершенно по-другому

Task 2.9 Translate into English

1. Иоганн Кеплер разработал модель планетарного движения планет, согласно которой они движутся по эллиптической орбите.
2. Квантовая теория делала попытку объяснить различные аномальные результаты экспериментов.

3. Закон всемирного тяготения Ньютона описывал фундаментальную силу гравитации.

4. Теории Ньютона не были правильными при всех возможных обстоятельствах.

5. Исследования физиков-теоретиков позволяют опровергнуть некоторые экспериментальные результаты.

6. За последнее столетие появились такие открытия как теория относительности и квантовая механика.

Grammar Focus

The -ing forms

The -ing forms can be used

1. as Participle I

a) in Continuous Tenses, for example:

I'm *doing* research on nuclear fission.

During World War II they were *experimenting* with radar.

b) as an adverbial modifier, for example:

Mel stopped, *realizing* he was talking to himself.

c) as an attribute, for example:

He asked me to talk to the woman *supervising* the projects.

2. as an adjective; the -ing adjective comes with a noun, for example:

The experiment was very *interesting*.

The commonest -ing adjectives are: *amusing, boring, disappointing, interesting, surprising, worrying, exiting, preceding, frightening, annoying*, etc.

3. as a gerund, the gerund comes

a) after preposition, for example:

I will call you *after arriving* at the laboratory.

He discovered the phenomenon *by experimenting*.

b) after personal pronouns, for example:

Thank you for *your supporting* the research.

c) after a specific verb, for example:

She *considers participating* in the conference next year.

Here is a list of verbs that are usually followed by a verb in -ing form:

admit, appreciate, avoid, carry on, consider, defer, delay, deny, detest, dislike, endure, enjoy, escape, excuse, face, feel like, finish, forgive, give up, can't help, imagine, involve, leave off, mention, mind, miss, postpone, practise, put off, report, resent, risk, can't stand, suggest, understand, etc.

d) as a subject of a sentence, for example:

Doing experiments was of great importance.

4. as a verbal noun, the -ing verbal nouns come with a determiner and an adjective, they usually take prepositional object, for example:

The last *meeting* was not very productive.

The *beginning* of the conference was fascinating.

Task 2.10 Find the -ing forms in the text above and define their function.

Speaking

Task 2.11 Speak about the birth of modern physics. Use questions in Task 2.6 as a plan.

Task 2.12 In pairs discuss the progress made in your field of science and its influence on life today. Use the questions from section A and possible answers from section B.

Section A

1. What is your field of science?
2. What are the current issues in your field of science?
3. What are the main notions / terms of your field of science?
4. What is your particular area of research?
5. What are the latest achievements in your field of science / research?
6. Can you name some outstanding researchers in your field of science?

What contribution have they made?

7. Do achievements in your branch of science/research influence everyday life? In what way?

8. What further developments can you predict in your field of science/research?

Section B

1. I do research in the field of
2. It is the science / a comparatively new branch of science that studies ...

The field of science that I'm concerned with gathers knowledge about .../ deals with ...

3. The main notions/terms are ...
4. My current area of research is
5. Major developments include advances in

Remarkable advances have been made in

The branches of science contributing a lot to progress in my field of research are

6. The most outstanding researchers in my field of science are

7. Some achievements in my field of science/research are used every day, for example ...

8. It's difficult / not difficult to foresee / forecast / predict I think ...

Academic Reading and Writing

Task 2.13 Choose a scientific article in English on your field of science/research and read it. Write a glossary (20 terms) to the article. See guidelines for writing a glossary in Appendix I.

Unit 2

MASTER OF SCIENCE PROGRAM

60-Second Listening

Task 1.1 a) Answer the questions: Why did you choose to go on with your study at master's program? What is life-long learning? What do you think about this concept?

b) Listen to the text about studying. Why do people study according to the text?

Before you Read

Task 1.2 Answer the following questions:

- a) What is a Master of Science degree awarded for?
- b) How many Master's programs does Novosibirsk State Technical University (NSTU) offer training in?
- c) Is admission to an MSc program competitive?
- d) How long do students study at MSc programs?
- e) Is a thesis defense obligatory?

Vocabulary

- | | |
|-----------------|-------------------------------------|
| 1. overwhelming | огромный |
| 2. enrolling | поступление, зачисление |
| 3. to enhance | повышать, увеличивать |
| 4. competitive | конкурсный, соревновательный |
| 5. eligible | приемлемый, подходящий. правомочный |
| 6. mandatory | обязательный |
| 7. average | средний, среднестатистический |
| 8. insight | понимание, знание |
| 9. approval | одобрение, согласование |
| 10. to assign | назначать |

Task 1.3 Read the text and check your answers.

Text 1

Master of Science Program at NSTU

A Master of Science degree (or an MSc for short) *is* a degree *awarded* at universities around the world for completion of graduate-level study in a science- or technology-related fields. The variety of different Master of Science programs at Novosibirsk State Technical University (NSTU) is overwhelming. NSTU has been awarding Master of Science degrees since 1996 and nowadays it offers Master's programs in forty-nine fields of study.

Enrolling in an MSc degree program is a significant instrument in one's professional career. It enhances career prospects and gives industry-oriented experience to its graduates. The philosophy of Master of Science program at NSTU provides practical, interdisciplinary skills and theoretical understanding of the chosen area. The MSc programs *are designed* to be completed in 20-24 months.

Admission to an MSc program at NSTU *is provided* on a competitive basis. First, the applicant's suitability for the program *is evaluated*. To be eligible for admission in an MSc program at NSTU, you must hold a Bachelor's degree awarded by an accredited university. The degree program looks for applicants with excellent study success in their previous studies. Secondly, applicants have to pass tests in their majors and to meet the mandatory language requirements. The applicants *are* then *ranked* according to the grade point average and the best applicants *are granted* admission.

The curriculum comprises several credit courses, a non-credit seminar course and a Master's thesis. Students attend lectures, laboratory works and seminars. The studies *are* closely *connected* with the relevant field. During the first semester students focus on the common subjects. During the second and third semesters students gain a deep insight into the chosen major. The course of study leads to the Master's thesis at the end of the second year of studies. The elective courses are subject to advisor approval.

Each student admitted to the graduate program *is assigned* an academic advisor. Students work out the details of their program in close consultation with their advisors.

Choosing NSTU Master of Science degree program is a smart move for at least four reasons:

- you can benefit from a complete learning experience;

- you can study at the university placed highly on international rankings;
- you can take advantage of NSTU’s preferential relations with top employers;
- you can live on a university campus with its numerous facilities.

After two years of studies and a thesis defense, students ***are awarded*** the Master of Science degree and can continue their research towards the Candidate of Science degree in engineering.

Developing Academic Vocabulary

Task 1.4 For each word below, read the sentence it occurs in the text above and answer the questions:

admission mandatory significant eligible to assign

- a) Is the word positive, negative or neutral?;
- b) Is it a noun, adjective, adverb or verb?;
- c) Can you think of a word with a similar meaning (synonym) and one with an opposite meaning (antonym)?

Reading comprehension

Task 1.5 Read the text again and define the main purpose of the text. Is it to offer ...

- a) a detailed description of study program and admission requirements at NSTU MS program?
- b) an argument for studying at NSTU?
- c) an evaluation of NSTU graduates’ career prospects?
- d) a comparison between MS programs at NSTU and other Russian universities?

Task 1.6 Answer the questions on the text.

1. What fields is the Master of Science degree usually awarded in?
2. How long has NSTU been awarding Master of Science degree?
3. What kind of experience does an MS program give to its graduates?
4. What does the philosophy of Master of Science program at NSTU provide?
5. What is the first requirement for the admission?
6. Must an applicant’s Bachelor’s degree be awarded by an accredited university?
7. What tests do the applicants have to pass?

8. What does the curriculum comprise?
9. What do students focus on during the second semester?
10. When do the students defend a thesis?
11. Who usually supervises the students' research and studies?
12. Can you enumerate the reasons for choosing NSTU Master of Science program?

Task 1.7 Read the statements and say whether they are true (T) or false (F). Correct the false ones.

1. A Bachelor's degree is awarded for completion of Master of Science program.
2. Nowadays NSTU offers Master's programs in forty-nine fields of study.
3. Enrolling in an MSc program cannot actually help one's career.
4. A Master of Science program at NSTU provides only practical skills.
5. Applicants to an MSc program at NSTU do not have to take any special tests.
6. The applicants are ranked randomly.
7. Students attend lectures and seminars.
8. The elective courses should be approved by a scientific advisor.
9. Students work in close consultation with their supervisors.
10. NSTU is placed highly on international rankings.

Task 1.8 Give the English equivalents to the following words and phrases

1. присуждать степень
2. сферы, связанные с наукой и техникой
3. важный инструмент в профессиональной карьере
4. карьерные перспективы
5. междисциплинарные навыки
6. прием, зачисление
7. на конкурсной основе
8. обязательные языковые требования
9. научный руководитель
10. в тесном сотрудничестве
11. обеспечивать чем-либо
12. профилирующий предмет

Task 1.9 Complete the sentences using the phrases from Task 1.8. The initial letters of words will help you.

1. Students work in c... c... with their a...
2. A... to an MS program at NSTU is p... on a c... b...
3. Enrolling in an MS degree program is a s... i... in my p... c...
4. Applicants should meet the m... l... r...
5. Master of Science degree is a... around the world.
6. Graduates work in a s... or t...r... fields.
7. MS program at NSTU p... p... and i... s...
8. MS students gain a deep insight into the chosen m...

Task 1.10. Match the words with their definitions.

1. to award	A to give or allow someone something, usually in an official way
2. overwhelming	B to give money or a prize following an official decision
3. to enroll	C to improve the quality, amount or strength of something
4. significant	D buildings, equipment, and services provided for a particular purpose
5. to enhance	E to decide a reason for something, to give a particular job or a piece of work to someone.
6. admission	F having the necessary qualities or satisfying the necessary conditions
7. eligible	G something that must be done or is demanded by law
8. mandatory	H to put in an official list, to accept in such a list
9. requirement	I permission to enter a place
10. to grant	J very great or very large
11. to assign	K what is wanted or needed by someone
12. facilities	L important or noticeable

Task 1.11 Put the words in the correct order.

1. awarding/ NSTU/ has/ of/ Science/ degree/ been / since/ Master/ 1996.
2. entered/ I/ research-oriented/ have/ a/ program.
3. major/ is/ physics/ My/ theoretical.
4. well/ I/ am/ informed/ this/ problem/ on.
5. Moreover/ collecting/ I/ am/ on/the material/ the problem.
6. significant/ is/ Master/ of/ instrument/ Science/ prospective/ program/ a/ career/ my /in.
7. me/ It/ provides/ practical/ theoretical/ with/of/ area/ chosen/ and/ understanding/ the.
8. An/ to / Admission/ MSc/ program/ competitive/ was.
9. majors/ as well as/ I/ to/ had/ pass/ a test/ in/ English/ in/ my.
10. admission/ granted/ I/ results/ had/ excellent/ I/ and/ was.
11. closely/ my/ studies/ are/ Now/ connected/ with/ field/ relevant/ the.
12. attend/ seminars/ works/ I/ laboratory/ and.
13. Also/ take/ I/ part/ in/ conferences/ scientific.
14. Ivanov/ is/ academic/ Professor/ my/ advisor.
15. work out/ I/ of/ my/ program/ in/ close/ the details/ consultation/ with/ him.
16. hope/ to/ I/ my/ Master's/ defend/ thesis/ in/ years/ two.

Grammar Focus

The passive

Academic texts typically contain a mixture of active and passive verb forms. You can decide to use the passive for a number of reasons, including:

1. To keep the focus on the action, idea, object or event being described rather than who or what carries it out:

The mixture **is inoculated** with a starter culture...

2. To avoid saying who did the action because it is unnecessary, obvious, or unimportant:

The mixture **is filtered** or **racked** to extract the sauce...

The Present and the Past Simple are often used in academic writing:

Present Simple

active: clean(s)/see(s) Somebody cleans the room every day.

passive: am/is/are cleaned/seen The room is cleaned every day.

Past Simple

active: cleaned/saw Somebody cleaned the room yesterday.

passive: was/were cleaned/seen The room was cleaned yesterday.

Task 1.12 Look at the verb forms in *italics* in the text *Master of Science program at NSTU*. Write them out and state: a) their voice forms; b) their tense forms. Translate the sentences into Russian.

Task 1.13 Make up sentences using the verbs and the patterns: [X is V₃]; [Xs are V₃]

Enroll develop assess choose admit

Task 1.14 Transform the sentences from Task 1.12. according to the schemes:

X is V₃ > X was V₃ > X will be V₃

Xs are V₃ > Xs were V₃ > Xs will be V₃

Listening

Task 1.15 You are going to watch an introduction to a lecture *Graduate Employability* given by Dr Siobhan Cleary. For questions 1-3 choose the correct answer: a, b or c.

1. The series of lectures is looking at
 - a) the work of engineering graduates
 - b) the relationship between course content and graduate employability
 - c) the prospects of engineering careers
2. Last week the lecturer talked
 - a) about the salaries of university graduates
 - b) about the development of communication skills
 - c) about why students study science and engineering in the first place
3. The purpose of the lecture is
 - a) to give a brief summary of expert views
 - b) to survey how well the course of study equips students to become successful
 - c) to tell the students about employers' expectations

Task 1.16 What did the lecturer do in the introduction? Tick (V) the correct answers.

- a) She introduced herself.
- b) She spoke about the curriculum.
- c) She stated the purpose of the lecture.
- d) She spoke about creative abilities.
- e) She explained the organization of the lecture.
- f) She welcomed the audience.
- g) She explained the content of the lecture.

Task 1.17 You are going to watch Extract 2 of the lecture *Graduate Employability* given by Dr Siobhan Cleary. For questions 1-6 choose the correct answer, *a*, *b* or *c*.

1. The lecturer is going to
 - a) speak about employment prospects
 - b) speak about current skills
 - c) speak about her own job experience
2. After narrowing down a shortlist of the most important skills comprised
 - a) fifty different skills
 - b) six key skills
 - c) five key skills
3. The interviewees named the most important job skill(s). According to them,
 - a) it is spoken communication
 - b) these are communication skills except presentation ones
 - c) these are communication skills encompassing both spoken and written communication, and presentation skills
4. Employers expect graduates to have
 - a) good engineering skills
 - b) good communication skills in all areas
 - c) both communication and engineering skills
5. Technical ability is
 - a) connected with people managing skills
 - b) means being able to understand technical issues
 - c) the desire to expand your technical knowledge as well as the ability to understand technical problems

6. According to the lecturer, people-based skills
- a) are natural and do not need to be developed
 - b) should be nurtured in everyday life
 - c) should be developed during the period of academic studies

Task 1.18 Watch Extract 2 again and decide what skills were NOT mentioned in the lecture.

- a) The ability to solve the problems
- b) The ability to deal with people
- c) The ability to memorize information fast
- d) The ability to analyse well
- e) Brilliant mathematical skills
- f) Creativity
- g) Having technical ability
- h) The ability to communicate well

Task 1.19 Make up a list of 5 top skills you consider to be important for a modern engineer. Explain your choice.

Task 1.20 Tell about MS program that you are taking at NSTU at the moment.

Text 2

Master of Science in Information and Technology (MSIT) at California Lutheran University

60-Second Listening

Task 2.1 a) Answer the questions: Do you like studying at MSc program? Why/Why not?

b) Listen to the text about students. What is good about being a full-time student according to the text?

Before you Read

Task 2.2 Answer the following questions.

- 1. What are key skills in today's marketplace?
- 2. What is at the core of any business organization?

3. Should IT students be provided with both solid technical foundation and sound practice?

4. What positions in IT fields do you know? Can you enumerate them?

5. Do you think that Master of Science in Information and Technology (MSIT) graduates can easily find a job?

Vocabulary

- | | |
|---------------------|---|
| 1. forward-thinking | дальновидный |
| 2. IT-enabled | с использованием / поддержкой ИТ |
| 3. holistic | всесторонний, комплексный |
| 4. pervasive | распространенный |
| 4. to target | нацелиться, ориентироваться на что-либо |
| 5. forecast | прогноз, предсказание |
| 6. curriculum | программа курса, учебный план |
| 7. to appeal | приходиться по душе, импонировать, привлекать |
| 8. position | должность |
| 9. track | направление, область специализации |
| 10. credit | зачетная единица |

Task 2.3 Read the text below and check your answers.

Overview

Data, analytics, and management of Information Technology are key skills in today's marketplace. Our Master of Science in Information and Technology (MSIT) program provides students with a solid and forward-thinking technical foundation used to effectively plan, design, implement and manage IT systems.

Quick Facts

MSIT prepares students to be strong technical leaders, ready to lead IT-enabled organizational change. The program is designed to be constantly relevant and practical for working professionals.

Careers in Demand

A Master's degree in Information Systems is considered by Forbes Magazine to be "The Best Master's Degree," with a projected employment

growth of 30 percent through 2020. “Earning this degree was holistic – it’s helped me to have a broader perspective of IT management, business, and the global industry. With the knowledge obtained, I believe I can offer valuable contributions to any company I work with.” Barbara Guarnieri said.

Program Highlights

Information Technology (IT) is pervasive today and is at the core of almost any business organization. The MSIT program targets both technical professionals wishing to advance their career in the field as well as business professionals wishing to gain valuable IT skills needed to transform enterprise operations. The curriculum is carefully designed to combine the study of fundamental theory with sound practice, applying latest technologies and tools to real-world problems in the comfort of the classroom.

Get Experience with Big Data

Providing timely and relevant information requires working with real-world data. Lots of data. Big data. That’s why California Lutheran students have access to invaluable research resources, including a fully functional data processing cluster and actual, real-world data sets.

A Growing Job Market

The job market for IT professionals is forecast for continued growth. The Occupational Outlook Handbook places various IT careers in five of the top 20 growth positions nationwide, and in seven of the top 10 positions in terms of job growth in Los Angeles County.

As an MSIT graduate, you will be prepared for a number of positions in the IT field including:

- Business/Systems Analyst
- IT Project Manager
- Data Analyst
- Business Intelligence Analyst
- System Developer
- Information Systems Manager
- Chief Information Officer
- IT Consultant
- Security Consultant
- Network Analyst/Administrator

Curriculum

The curriculum includes a total of 12 graduate courses (36 credits) total. Students will take eight core courses and four elective courses in their specialized track. Students can obtain a general MSIT degree by selecting elective courses across tracks. Students with backgrounds that are not in Information Technology (IT) or business may need foundation courses which do not count towards the 36 credits required for the degree.

Course Terms & Calendar

On-campus courses are offered year-round in four, 11-week terms. The on-campus option appeals to those students living in the area who prefer face-to-face, evening classes or find value in taking a combination of on-campus and online classes.

On-Campus Terms

Fall Term	September-November
Winter Term	December-February
Spring Term	March-May
Summer Term	June-August

Developing Academic Vocabulary

Task 2.4 For each word below, read the sentence it occurs in the text above and answer the questions:

admission implement availability pervasive solid

- a) Is the word positive, negative or neutral?;
- b) Is it a noun, adjective, adverb or verb?;
- c) Can you think of a word with a similar meaning (synonym) and one with an opposite meaning (antonym)?

Task 2.5 Find synonyms to the words given

- 1) apply: a) administer; b) determine; c) bring into use; d) employ
- 2) valuable: a) costly; b) precious; c) bright; d) irreplaceable
- 3) implement: a) bring about; b) carry; c) accomplish; d) achieve
- 4) relevant: a) loyal; b) connected; c) applicable; d) essential

Task 2.6 Give the English equivalents to the following words and phrases

- 1) ключевые навыки
- 2) иметь доступ к бесценным исследовательским ресурсам
- 3) эффективно планировать, разрабатывать применять на практике и управлять информационными решениями и системами
- 4) преобразовывать деятельность предприятий
- 5) сочетать изучение фундаментальной теории с серьезной практикой
- 6) применять новейшие технологии и инструменты для решения современных проблем

Task 2.7 Complete the table with appropriate word forms.

VERB	NOUN	ADJECTIVE
to describe	<i>description</i>	descriptive
to apply	1)	2)
3)	comparison	4)
to manage	5)	6)
to value	7)	8)
9)	argument	10)

Reading comprehension

Task 2.8 Define the main purpose of the text. Is it to offer ...

- a) a detailed description of study program and admission requirements at California Lutheran University MSIT program?
- b) an argument for studying at California Lutheran University?
- c) an evaluation of MSIT graduates' job possibilities?
- d) a comparison between MSIT programs in Russia and abroad?

Task 2.9 Answer the questions on the text:

- 1) What does MSIT program provide students with?
- 2) How long does the program of study last?
- 3) Are there any options available for students who cannot study full-time?
- 4) What magazine considers MSIT to be "The Best Master's Degree"?
- 5) Who does the MSIT target?
- 6) What does the curriculum of study combine?
- 7) Can MSIT graduates find a job easily?

- 8) What positions are MSIT graduates prepared for?
- 9) What language does this university offer programs in?
- 10) When can the students start the program?

Grammar Focus

Compound adjectives

A compound adjective is an adjective that includes more than one word. We put a hyphen between two or more words when we want them to act as a single idea: **remote-controlled** (*с дистанционным управлением*)

low-paid (*низкооплачиваемый*).

Task 2.10 Study the phrases from the text *Master of Science in Information and Technology*, try to translate them:

forward-thinking foundation

IT-enabled organizational change

real-world problems/ data

Task 2.11 Translate into Russian.

Brand-new, red-brick, well-balanced, trouble-free, labor-saving, present-day, long-distance, four-door, five-page, right-angled, cross-channel, nuclear-free, freeze-dried, mass-produced, cast-off, life-size, well-known.

Task 2.12 Translate the sentences into English using the compounding adjectives given.

ill-equipped more-qualified time-consuming well-equipped hard-working full-scale two-year air-conditioned

- 1) Этот эксперимент длителен и полномасштабен.
- 2) Наша лаборатория хорошо оборудована и кондиционируема, поэтому мы работаем быстро и эффективно.
- 3) Если вы хотите выучить испанский, вы должны записаться на двухгодичные курсы.
- 4) Он является ярким примером упорного ученого.
- 5) Эта больница плохо оснащена, но персонал высококвалифицированный.

Listening

Task 2.13 Listen to the text about online MS program in Information Technology and decide which of the following is the main idea:

- 1) to give detailed information about the focus of Online MSc in Information Technology and the prospects it gives

- 2) to give information about the costs of earning a master's degree
- 3) to give detailed information about the positions available in the field of IT

Task 2.14 Listen again and tick the correct statements:

1. Earning a master's degree provides an advanced understanding of your field.
2. Online MSc in Information Technology focus only on communication, cooperation and management.
3. The specific school and program a student chooses will influence tuition fee greatly.
4. IT support workers only help entire staff of a business with their technology challenge.

Task 2.15 Listen to the text and complete the notes:

1. Alternatively, you can choose to continue your education by ... in graduate school and ... your master's degree.
2. Courses ... computer science and engineering, information analysis and management, and ... administration.
3. Through your studies, you should be completely comfortable creating and ... a corporate database or network.
4. Students often ... from gaining qualifications for advanced positions and earning a higher ... than would be possible otherwise.
5. Additionally, choosing to study online will typically ... the cost somewhat.
6. While it may not seem like it at first, there are many different positions ... in the field of IT.
7. Database administrators are ... with maintaining and managing these systems.
8. Finally, there is also work on the analysis side of information technology that ... examining business information and ... useful reports.

Speaking

Task 2.16 Find information on MSc programs similar to yours at foreign universities and answer the questions.

1. What is the name of the MSc program?
2. What is the aim of the program?
3. How long does the MSc program last?
4. Is the study on the program offered on full-time or part-time basis?

5. What is an essential component of the program?
6. What experience can you get taking the program?
7. What are the main program's tracks?
8. What are the core research areas of the program? Which one would you choose?
9. What is the structure of the program?
10. What electives are offered?
11. What are the minimum admission requirements for foreign applicants?
12. Can the applicants for the program get a scholarship?

Task 2.17 Compare two MSc programs (MSc program that you are taking at the moment and the program at a foreign university you have learnt about) according to several criteria and complete the table.

MSc program in at NSTU	MSc program in at(a foreign university)

Task 2.18 Discuss these two programs with your partner. (Role-play: student 1 – a master student at NSTU; student 2 – a master student at a foreign university). Use questions from Task 2.16.

Text 3

My Research Work

60-Second Listening

Task 3.1 a) Answer the question: What spheres do you think research is the most important into nowadays? Why?

b) Listen to the text about research. According to the text, what research is the most important scientists ever do?

Before you read

Task 3.2 Answer the questions

1. What is your special subject?

2. What field of knowledge are you doing research in?
3. What is the title of your master's thesis?
4. Who is your research adviser?
5. How many scientific papers have you published?

Vocabulary

1. to be engaged in sth	быть вовлеченным
2. undergraduate student	студент бакалавриата
3. to do research	проводить исследование
4. aim	цель
5. cooperation	сотрудничество
6. to encounter	столкнуться
7. thesis	диссертация
8. to acquire	получить, приобрести
9. to defend	защитить
10. to obtain	получить

Task 3.3 Read the text and complete the gaps with information on your research work.

I've entered a research-oriented MSc program as I was already engaged in research when I was an undergraduate student. I was doing research under the supervision of Professor / Associate Professor _____, an authority in the field. I belong to the department of _____. The academic staff of our department are engaged in active research in almost all branches of _____.

The title of my master's thesis is "_____". I combine practical work with scientific research. I am doing research in _____. My aim is to _____.

This branch of knowledge has been rapidly developing in the last two decades. The obtained results have already found wide application in most varied spheres of the country's national economy. I am particularly interested in _____ which includes _____. I have been working at the problem for _____ years. I got interested in it when I was an undergraduate student. My work is primarily of practical importance. It is based on the theory of _____ developed by _____.

I work in close cooperation with my colleagues. There are several research teams at our department. The team I work in is headed by _____.

_____. He is my scientific adviser. I always consult him when I encounter difficulties in my research. We often discuss the obtained data.

I have not yet completed the experimental part of my thesis, but I am through with theoretical part. So far I have written _____ scientific papers, some of which were published when I was a student.

At NSTU, MSc programs are research-oriented. While studying in this program I've acquired research skills to analyse, collect, and process information, and generate new ideas and original methods. I take part in various scientific conferences where I make reports on my subject. I willingly participate in scientific discussions and debates. I am planning to finish writing the thesis by the end of next academic year. I hope to obtain Master's degree in _____.

Developing Academic Vocabulary

Task 3.4 For each word below, find the sentence it occurs in the text above and answer the questions:

thesis acquire experimental difficulties willingly

- Is the word positive, negative or neutral?;
- Is it a noun, adjective, adverb or verb?;
- Can you think of a word with a similar meaning (synonym) and one with an opposite meaning (antonym)?

Task 3.5 Find synonyms to the words given

- do research: a) analyse; b) carry out research; c) conduct research; d) pursue research
- obtain: a) give; b) award; c) get; d) gain
- supervision: a) examining; b) guidance; c) administration; d) surveillance
- scientific paper: a) scientific data; b) scientific report; c) scientific article; d) scientific journal

Task 3.6 Give the English equivalents to the following words and phrases

- научно-ориентированная магистерская программа
- проводить исследования под руководством профессора
- совмещать практическую работу с научными исследованиями
- найти широкое применение в различных сферах
- работать в тесном сотрудничестве с

6. приобрести исследовательские навыки
7. принимать участие в научных конференциях
8. закончить написание диссертации

Reading comprehension

Task 3.7 Define the main purpose of the text. Is it to offer ...

- a) a brief description of a research work?
- b) a detailed description of methods used in a research work?
- c) a comparison between BS and MS programs at NSTU?

Task 3.8 Answer the questions:

1. What MS program have you entered?
2. What department do you belong to?
3. What is your special subject?
4. What field of knowledge are you doing research in?
5. Have you been working at the problem long?
6. What is the title of your master's thesis?
7. Is your work of practical or theoretical importance?
8. Who do you collaborate with?
9. How often do you consult your scientific adviser?
10. Have you completed the experimental part of your dissertation?
11. How many scientific papers have you published?
12. What research skills have you acquired while studying in the program?
- 13) Do you take part in scientific conferences?
- 14) Where and when are you going to obtain the MSc degree?

Grammar Focus

Present Perfect vs Past Simple

The Present and the Past Simple are often used in academic writing:

Present Perfect

active: has/have published/ written

passive: has/have been published/ written

We often use Present Perfect to talk about actions that are completed before now. These actions are completed in the period of time that is unfinished.

Two articles *have been published* in the journal this year.

Past Simple

active: published/wrote

passive: was/were published/written

We use Past Simple to talk about finished actions and situations in the past. We know, and often say, the time of the action or situation.

They *published* an interesting article in Scientific American last month.

Present Perfect vs Past Simple

Task 3.9 Find examples of these tense forms in the text above. Explain the use of Present Perfect vs Past Simple forms.

Task 3.10 Complete these sentences with the Present Perfect or Past Simple of the verbs in brackets.

1. I (play) a lot of tennis this year.
2. She (have) six different jobs since she graduated from the university.
3. How many cups of coffee (you drink) today?
4. In those days, Andrew (come) to stay with us most weekends.
5. Since my brother lost his job, he (write) two books.
6. Would you believe I (make) twenty-three phone calls today?
7. Mary (go) to Australia for a while but she's back again now.
8. I did German at school but I (forget) most of it.
9. I (have) a headache earlier but I feel fine now.
10. "Is Helen still here?" "No, she (just/go) out".
11. Ann (give) me her address but I'm afraid I (lose) it.
12. What do you think of my English? Do you think I (improve)?
13. I (not read) her latest book.
14. Columbus (not discover) America: the Indians already (know) where it was.
15. Amazing news! Scientists (discover) a new planet!
16. I (never enjoy) a holiday as much as this one.

Speaking

Task 3.11 Tell about your research work. The questions from Task 3.8 can be a plan.

Academic Reading and Writing

Task 3.12 Think about a research project in your area. In pairs, take turns to summarise the project following the instructions (1-6) below.

1. State the aim of your research

2. Define what the problem is
3. Explain why your topic is worth researching
4. Say what the expected outcomes of the research are
5. Outline the procedures you will follow
6. Outline how you will limit your investigation

Task 3.13 Read the project summary below and match the underlined sections in the summary (A-F) to the correct points (1-6) from the list in Task 3.12.

A 3-D odour-compass for odour-detecting robots

Odour-sensing robots offer many benefits over the current use of animals in similar roles, including safety, efficiency and durability. (A) However, the robots which have been developed to date are limited by the fact that they can only accurately detect and navigate toward odour plumes if they are within direct 'sight' of the chemical source. Clearly, in real world situations, obstacles may well impede the robot's detection ability, and at present, odour-sensing robots are therefore only of limited use. (B) The proposed research will concentrate on developing a robot which is able to gather readings in three dimensions and therefore overcome the limitations of current models in odour-detection. (C) This technology will make robots more effective substitute for animals.

(D) This research aims to develop existing robotic technology to create a three-dimensional odour compass to be used as a navigation tool in searching for an odour source. (E) This will then be tested experimentally in simulated environments where wind detection is not stable or where obstacles interfere with odour distribution. A second stage in the research will be to develop the robot's environmental sensors, thus, allowing it to safely negotiate the terrain to reach the source of the odour. (F) This should produce a robot which is able to both detect and move to the source of an odour, even on difficult terrain.

Task 3.14 Complete the project summary below using the correct word or phrase from the list.

<i>aims to</i>	<i>however</i>	<i>the initial phase</i>	
	<i>the proposed research</i>	<i>the study</i>	<i>will indicate</i>

Consumer interest in wines produced in organic vineyards has increased significantly in the last few years. (1) _____, to date it is un-

clear whether these production methods actually improve soil or grape quality. (2)_____ will be the first phase of a long-term study on a New Zealand vineyard. These results (3)_____ whether methods of viticulture improve grape quality.

The research (4)_____ investigate the effects of organic agriculture on soil and grape quality. (5)_____ will consist of two treatments, organic and conventional (the control), each replicated four times in a randomized, complete block design. All organic practices will follow the standards set out by the Food Standards Australia New Zealand (FSANZ). (6)_____ will assess soil quality using physical, chemical and biological indicators over six year. The next phase will then assess the physiology of the vines.

Task 3.15 Write a project summary of about 180-220 words for your research. Use the useful language for writing a project summary from Appendix II.

Unit 3

SCIENTIFIC LITERATURE

60-Second Listening

Task 1.1 a) Answer the questions: How often do you read books? What kind of books do you prefer? What is literature for you?

b) Listen to the text about literature. According to the text, why can literature be powerful? What is the function of scientific literature?

Before you read

Task 1.2 Answer the questions:

1. What scientific genres do you know?
2. How many components can a scientific article include?
3. What are these components?

Academic Reading and Writing

Task 1.3 Scan the scientific article and analyze its structure. What are the main components of the article? Make up a plan/ scheme -model of the article.

Text 1

HIGH-PERFORMANCE PERFLUORINATED POLYMER ELECTRET FILM FOR MICRO POWER GENERATION

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Abstract: The development of a new high-performance polymer electret material with high surface charge density, stability, and high thermal resistibility of electric charge was studied. Previously, we found that MEMS-friendly perfluorinated polymer CYTOPTM CTL-M (Asahi Glass Co., Ltd.) shows excellent electret properties. In the present study, it is reported that the electret property and the thermal stability of CYTOPTM electret are markedly improved by doping silane coupling reagent into polymer. The charge density of 1.5 mC/cm², which is 1.6 times larger than that of the undoped CYTOPTM, has been obtained on 16 μ m-thick film. In addition, the power generation of 0.585 mW, which is about twice of our previous data, has been achieved at a low seismic frequency of 20Hz.

Key words: Electret, Energy harvesting, Micro power generation, Perfluorinated polymer, CYTOP

1. INTRODUCTION

Recently, the micro power generation systems as the alternatives of conventional secondary batteries attracted much attentions. It is known that the devices applying to RFIDs and mobile sensor networks consume a low electrical power. The vibration-driven energy harvesting devices are proposed for these applications [1-3]. Since the frequency range of vibration existing in the environment is below a few tens of Hz, electret power generators should have higher performance than electromagnetic ones [4-8].

We recently reported that CYTOPTM CTL-M (Asahi Glass Co., Ltd.), MEMS-friendly amorphous perfluorinated polymer, can possess high surface charge density, which is stable enough for electret material [7,8]. We also found that up to 0.28 mW can be obtained with the CYTOPTM electret at an oscillation frequency as low as 20Hz. However, higher surface charge density is required for better performance, and charge stored in CTL-M becomes unstable at relatively low temperature. In the present study, a novel electret material based on CYTOPTM is proposed for higher surface charge density and thermal stability, and its electret properties are systematically investigated.

2. ELECTRET POWER GENERATOR

Figure 1 shows a schematic of the micro electret generator designed in our previous study [7]. When the in-plane vibration is generated, the seismic mass with the electret brings about a relative motion to the counter electrode on the bottom substrate. Thus, the amount of induced charge on the counter electrode is changed corresponding to the overlapping area. Consequently, electric current is generated in the external circuit. The seismic mass is supported by high-aspect-ratio soft springs made of Parylene [9], which enables large amplitude of vibration and low resonance frequency.

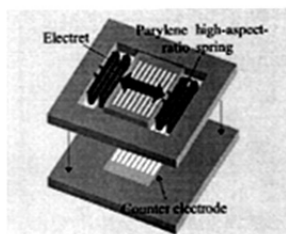


Fig. 1: Schematic of micro seismic electret power generator.

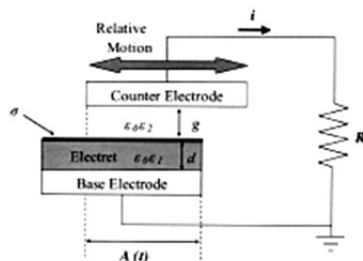


Fig. 2: Model of electret power generator.

Figure 2 shows a schematic of the simplified generator structure, where σ , d , g , and A are respectively the surface charge density, the thickness of electret, the gap between the electret and the counter electrode, and the overlapping area. Boland et al. [5] show that the maximum output power P_{MAX} is proportional to the squared surface charge density (σ^2), and is increased with the thickness of electret (d). On the other hand, the optimal external load R_{MAX} is independent of σ , but linearly dependent on d and g . P_{MAX} is also proportional to the time derivative of the overlapping area $dA(t)/dt$. Thus, the vibration frequency, the amplitude of vibration, and the number of poles should also have large impact on the generator performance.

3. POLYMER ELECTRET MATERIAL

Various kinds of materials have been examined for electrets [10]. Among them, polymer dielectric materials, especially fluorinated polymers such as PTFE, are generally employed. Hsieh et al. [11] use Teflon[®] AF (Du Pont) as the electret material for their MEMS microphone.

In our previous work [12], we found that CYTOP[™] CTL-809M (Asahi Glass Co., Ltd.), which is amorphous perfluorinated polymer, can be also used for electrets. The candidates of dielectric for electret need to meet the following three requirements;

- Compatible with MEMS fabrication technique
- Easy to be formed into thick film
- Having high dielectric strength

CYTOP[™] is compatible with MEMS fabrication process; it is soluble in perfluorinated solvents, and thus thick films can be obtained by

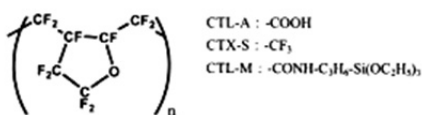


Fig. 3: The molecular structure and the end groups of CYTOP[™].

multiple spin-coating. In addition, coated films can be patterned easily with photolithography process and O_2 plasma etching.

Tsutsumino et al. [7] found that the surface charge density of CYTOP[™] is three times larger than that of Teflon[®] AF. Since power output of electret generator is proportional to the square of the surface charge density, electret generators with CYTOP[™] can produce electricity nine times larger than generators with Teflon[®] AF.

The molecular structure of CYTOP[™] is shown in Fig. 3. CYTOP[™] is the perfluorinated polymer, so there are no hydrogen atom in the main chain, and that leads to unique properties as follows; (i) high chemical stability in any acids, alkalis, and organic solvents except for perfluorinated solvents, (ii) low surface energy (17 dyne/cm), (iii) high thermal stability (thermal decomposition temp is over 350 °C), (iv) low dielectric constant (2.1), (v) high volume resistivity ($>10^{17} \Omega \text{cm}$). There are three different types of CYTOP[™], which end groups are different respectively; the carboxylic acid type (CTL-A), trifluoromethyl type (CTL-S), and aminosilane type (CTL-M) [13].

To evaluate the performance of the electret material, we have measured temporal change of the surface charge density σ by using a surface voltmeter (Model279, Monroe Electronics). 16- μm -thick CYTOP[™] was spin-coated on 0.3-mm-thick copper substrate with area of 30x30 cm^2 . The sample was charged by corona charging with -8 kV needle voltage for 3 minutes at 120 °C. Figure 4 shows the surface charge density data obtained for CTL-S, CTL-A, CTL-M, and CTL-NMD, which is a new material developed in the present study. Samples were stored at 23 °C and 60 % humidity. This figure shows that 'pure' CYTOP[™] CTL-S is the least stable, and the surface charge density is reduced to about 30% of its initial value in 1500 hours. On the other hand, small amount of functional end groups like

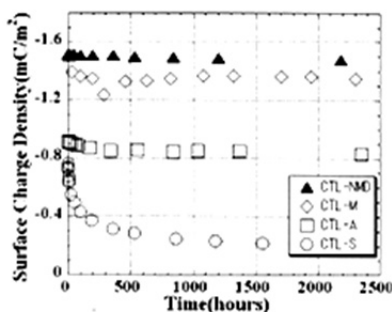


Fig. 4: Time trace of the surface charge density of Perfluorinated polymer electret films, CYTOPTM CTL-S, CTL-A, CTL-M and CTL-NMD.

carboxylic acid or aminosilane significantly enhance the electret performance; the surface charge density becomes higher, and the charge decay is suppressed. Especially, aminosilane end group (CTL-M) has the best performance to promote the surface charge density. To introduce more aminosilane into the CYTOPTM electret, we doped silane coupling reagent to CTL-A, accomplished the highest surface charge density of 1.5 mC/cm² (CTL-NMD)

To examine the thermal stability of charged electret, the open circuit thermally-discharge (TSD) measurement [14] has also been performed. Different TSD spectra peaks correspond to different charge trap mechanisms in dielectric materials [10, 14]; the peak corresponding to the dipole appears at the lowest temperature near the glass transition temperature ($T_g = 108^\circ\text{C}$). Peaks at the higher temperatures correspond to the surface and bulk traps. Therefore, TSD spectra are very useful for optimizing charging conditions and materials for more stable electrets.

The electret sample (e.g. copper substrate) and a facing probe were connected as shown in Fig. 5, and heated up at the rate of $1^\circ\text{C}/\text{min}$. Since the temperature increased, thermal energy was applied to electret and the trapped charges were released. The discharged current was measured with an electrometer (Model 6517A, Keithley Instruments) set into the circuit. As shown in Fig. 6, TSD spectra of CTL-S has a peak at 135°C ,

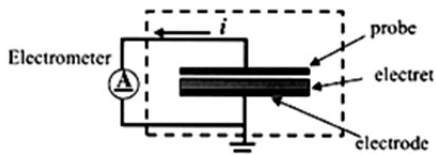


Fig. 5: Experimental setup of Thermally-stimulated-discharge (TSD) measurement.

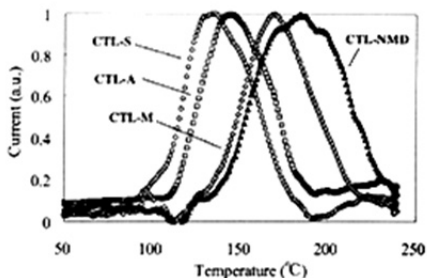


Fig. 6: Thermally-stimulated-discharge (TSD) spectra of CYTOPTM electret films.

which is the lowest among four samples examined. The peak shifted to higher temperature, when the functional end group is introduced into the chemical structure of CYTOPTM. Especially, aminosilane promotes the thermal stability of trapped charge effectively, and the peak temperature of CTL-NMD TSD spectra has been improved to 185°C , which is even higher than that of CTL-M and CTL-A. Therefore, not only the surface charge density, but also the thermal stability of charges can be improved with the doping of silane coupling reagent.

4. POWER GENERATION EXPERIMENT

Figure 7 shows the experimental setup for power generation, which consists of a patterned electret, a counter electrode, an alignment XYZ stage, and an electromagnetic shaker [7,8]. The electret and the counter electrode were microfabricated with standard lithography process. By using multiple spin coating technique, 16 μm -thick electret film was obtained after curing, followed by O_2 plasma etching for patterning.

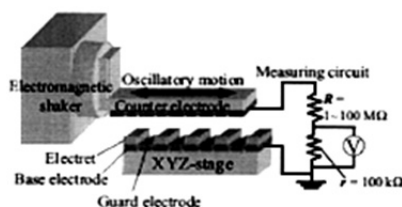


Fig. 7: Schematic of power generation experiment setup.

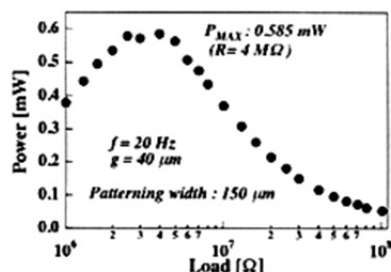


Fig. 8: Power output versus external load.

Finally, corona charging technique was applied to acquire surface potential of more than -550V. Total area of the electret was 20 x 20 mm² with an interdigital electrode configuration, where the line/space is 150 μm.

Figure 8 shows the output power with the CTL-M electret thus fabricated versus the external load for the oscillation amplitude of 1.2 mm_{rms} at 20Hz. Peak power output of 0.595 mW, which is about twice of our previous data [8], has been obtained at the external load of 4 MΩ. Power generation experiment using the new electret material is now undertaken.

5. CONCLUSION

We examined MEMS-friendly perfluorinated polymer CYTOPTM with different functional end groups for electret generator applications through measurements of surface charge density and thermally-stimulated discharge. We have found that the aminosilane end group provides better surface charge density and thermal stability, and developed a novel electret material with the

doping of silane coupling reagent. We also have obtained 0.59 mW at a low seismic frequency of 20Hz in our prototype power generator, which is about twice of our previous data.

ACKNOWLEDGMENT

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REFERENCE

- [1] C. B. Williams, and R. B. Yates, *Sensors Actuators, A*, vol.52, pp. 8-11, 1996
- [2] S. Roundy, P. K. Wright, and J. Rabaey, *Comp. Comm.*, vol. 26, pp. 1131-1144, 2003
- [3] J. A. Paradiso, and T. Starner, *IEEE Pervasive Comp.*, vol. 4, pp. 18-27, 2005
- [4] Y. Tada, *IEEE Trans. Electrical Insulation*, vol. 21, pp. 457-464, 1986
- [5] J. Boland, C.-H. Chao, Y. Suzuki, and Y.-C. Tai, *Proc. 16th IEEE Int. Conf. MEMS*, Kyoto, pp. 538-541, 2003
- [6] J. S. Boland, J. D. M. Messenger, H. W. Lo, and Y.-C. Tai, *Proc. 18th IEEE MEMS 2005*, Miami, pp. 618-621, 2005
- [7] T. Tsutsumino, Y. Suzuki, N. Kasagi, and Y. Sakane, *Proc. 19th IEEE MEMS 2006*, Istanbul, pp. 98-101, 2006
- [8] T. Tsutsumino, Y. Suzuki, N. Kasagi, K. Kashiwagi, and Y. Morizawa, *Proc. PowerMEMS 2006*, Berkeley, pp. 279-282, 2006.
- [9] Y. Suzuki, and Y.-C. Tai, *J. MEMS*, vol. 15, pp. 1364-1370, 2006
- [10] G. M. Sessler, "Electrets 3rd Edition," Laplacian Press, 1998
- [11] W. H. Heisch, T. J. Yao, and Y.-C. Tai, *Int. Conf. Solidstate Sensors Actuators (Transducers '99)*, Sendai, pp. 1064-1067, 1999
- [12] Y. Arakawa, Y. Suzuki, and N. Kasagi, *Proc. PowerMEMS 2004*, Kyoto, pp. 187-190, 2004
- [13] CYTOPTM Technical Bulletin, ASAHI GLASS Co., LTD.
- [14] H. Seggern, *J. Appl. Phys.*, vol. 50, pp. 2817-2821, 1979

Task 1.4 Compare the scheme -model of your own with the scheme-model of a scientific article from Appendix III.

Task 1.5 Complete the Literature Review Chart below on the content of the article above. Use only key sentences.

Literature Review Chart

Citation Information	
Topicality of Study	
Problem	
Solution/ Aim of study	
Methodology	
Results and conclusions	
Contribution/Significance of Study	

Task 1.6 Select three scientific articles on your field / research. Complete Literature Review Chart for each article.

Text 2

Learning about Electronics

60-Second Listening

Task 2.1 a) Answer the question: What is plagiarism?

b) Listen to the text about plagiarism. According to the text, how can a writer avoid plagiarism?

Academic Reading and Writing

Task 2.2 Answer the question: What secondary scientific genres do you know?

Task 2.3 Read *theoretical review* on abstracting and summarizing from Appendix IV. Define the difference between a summary and an abstract. How can a writer avoid plagiarism while writing a summary/ an abstract?

Task 2.4 Answer the questions: What is electronics? What does it deal with?

Task 2.5 Read the text about electronics and check up your answers.

Electronics is quite a complicated subject, taking in some physics, some chemistry, some mechanical engineering, and even some drawing. There is a lot to learn, but the most important part of learning the subject is understanding the underlying principles. Once you have mastered these, learning the rest of it is relatively easy.

It is possible to put a lot of mathematics into electronics, but it isn't necessary to an understanding of the subject. Of course, mathematics is necessary when calculating what voltages, currents and components your circuits use, but the calculations are really very simple: more 'arithmetic' than 'mathematics'.

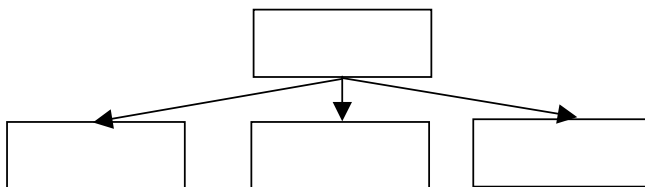
A study of electronics can be divided, broadly, into three rather separate disciplines: electricity, analogue electronics and digital electronics.

Electricity is basic to the whole thing; you need to know a certain amount about electricity before you can begin to understand anything about the way electronic devices work. And before you do much work with electricity, you must learn about safety.

Analogue electronics (or analog, which is the American spelling) is the study of systems in which electrical quantities vary continuously. Examples are radio, record and tape players, and television receivers.

Digital electronics is the more recent aspect of the subject, and deals with electrical quantities that vary in discrete steps instead of smoothly. Many digital systems deal with only two possible values. The most important example is digital computers.

Task 2.6 Complete the graph of the text:



Task 2.7 Divide the text into two subtexts. What are they? What is the function of the crossed sentence in the structure of the whole text?

Task 2.8 Summarize the underlined sentences using the patterns:

X is **a material** that ...=> The author describes X **as a material** that ...
X is considered **as a material** that ...

Task 2.9 Write a summary of the text. Use useful language for summarising from Appendix V.

Text 3

Generation of Electricity

60-Second Listening

Task 3.1 a) Answer the question: What is the significance of electricity?

b) Listen to the text about electricity. According to the text, what are negative points about electricity?

Before you read

Task 3.2 Look at the title of the text. What do you think the text is about?

Task 3.3 What means of connection do you know? What is the function of each of the group? Consult Appendix VI.

Task 3.4 Read the text and complete the gaps (1–4) with the sentences (A–D) below. Pay attention to the means of connection.

Historically, knowledge of electrical manifestation goes back to the early Greeks who noticed that amber, after being rubbed, had the power to attract feathers or small bits of straw. Through the ages many people have experimented with and studied the nature of this strange power, and by their efforts it has been brought under control and made one of man's most useful servants.

(1) _____. The explanations given here are made as simple and nontechnical as possible.

Electromotive force (emf) is the force or pressure that causes electric current to flow. The unit of measure of this force is the volt. Electromotive force is sometimes called "potential" or "voltage". Electric current will flow in a wire when sufficient voltage is present. (2) _____. Volts and amperes are measured by dial instruments called voltmeters and ammeters.

The amount of electric power that is delivered by a generator or is consumed by a motor or other power device is the product of the pressure and the flow. (3) _____. The unit of measure of power is the watt. Therefore, watts = volts x amperes. Instruments for indicating or recording watts are called wattmeters. (4) _____.

A. Thus, power = volts x amperes.

B. Before studying the way in which electrical power is generated, certain terms must be explained and certain manifestations must be discussed in order to make the study meaningful.

C. The unit of measurement of electric current flow is the ampere.

D. For designating large amounts of power the term "kilowatt" or kw, which means one thousand watts, is used.

Task 3.5 Read the whole text, find keywords in the paragraphs and make up a plan.

Task 3.6 What structure does the text have? Deductive, inductive, closed-in or pivotal? See Appendix IV.

Task 3.7 Give another title to the text.

Task 3.8 Write an abstract to the text. Use the phrases below.

The title of the text is ...

The text starts with ...

..... is described in the text.

.... are given/ explained/ discussed.

Appendix I

Guidelines for Writing a Glossary

A glossary is a list of terms that traditionally appears at the end of an academic paper, a thesis, a book, or an article. The glossary should contain definitions for terms in the main text that may be unfamiliar or unclear to the average reader. To write a glossary, you will first need to identify the terms in your main text that need to be in the glossary. Then, you can create definitions for these terms and make sure the formatting of the glossary is correct so it is polished and easy to read.

Writing Definitions

A formal definition is based upon a concise, logical pattern that includes as much information as it can within a minimum amount of space. The primary reason to include definitions in your writing is to avoid misunderstanding with your audience. A formal definition consists of three parts:

- The term (word or phrase) to be defined
- The class of object or concept to which the term belongs
- The differentiating characteristics that distinguish it from all others of its class

For example:

Water (term) is a liquid (class) made up of molecules of hydrogen and oxygen in the ratio of 2 to 1 (differentiating characteristics).

Comic books (term) are sequential and narrative publications (class) consisting of illustrations, captions, dialogue balloons, and often focus on super-powered heroes (differentiating characteristics).

Astronomy (term) is a branch of scientific study (class) primarily concerned with celestial objects inside and outside of the earth's atmosphere (differentiating characteristics).

Avoid defining with “X is when” and “X is where” statements. These introductory adverb phrases should be avoided. Define a noun with a noun, a verb with a verb, and so forth. Do not define a word by mere repetition or merely restating the word.

Appendix II

Useful Language for Writing a Project Summary

Topicality	<i>In recent years, there has been an increasing interest in ...</i> <i>An interest in...has increased significantly in the last few years.</i> <i>Recent developments in X have heightened the need for ...</i> <i>.... plays a vital role in the ... of...</i> <i>... is of interest because ...</i>
Problem	<i>However, very little is known about ... in ...</i> <i>...is one of the most frequently stated problems with</i> <i>Previous studies of ... have not dealt with ...</i> <i>Most studies in the field of... have only focused on ...</i> <i>One of the greatest challenges ...</i> <i>The main disadvantage of is that ...</i>
Solution/ Aim of study	<i>The study aims to contribute to</i> <i>The aim of this study is to investigate ...</i> <i>The aim of this study is to clarify several aspects of</i> <i>The specific objective of this study is to ...</i> <i>The aim of this research project is therefore to try and establish what ...</i>
Limitations	<i>The proposed research will concentrate on...</i> <i>The study will focus on ...</i> <i>The study will not engage with ...</i> <i>It is beyond the scope of this study to examine the ...</i>
Study proce- dures	<i>The first step in this process will be to</i> <i>The second method to be used is ...</i> <i>The initial stage is to ...</i> <i>The next phase will be to ...</i> <i>In the follow-up phase of the study</i>
Expected Results	<i>This technology will make ...</i> <i>This should produce ...</i> <i>The results will indicate ...</i> <i>We expect ...to be ...</i> <i>This research will serve as ...</i>

Appendix III

Scheme-Model of the English Scientific Article

(Схема-модель английской научной статьи)

Субжанр (Subgenre)		Тематическое предложение (Moves)
Заглавие (Title)		
Автор(ы), организация, адрес (Author(s), Affiliation, Address)		
Аннотация (Abstract)		<ul style="list-style-type: none"> – тема и цель исследования (Subject and Purpose of Study) – методы (Methods) – результаты (Results) – общие выводы (General Conclusion)
Введение (Introduction)		<ul style="list-style-type: none"> – актуальность темы/исследования/ статьи (Importance of the Study/ Paper) – изложение истории вопроса (Background of Study) – нерешенные вопросы (Lack of Knowledge) – постановка цели исследования (Focus/Purpose of Study/Paper)
Основная часть (The Main Body)	Методы (Methods)	<ul style="list-style-type: none"> – описание методов и методик (Description of Methods and Techniques) – описание оборудования и материалов (Description of Equipment and Materials) – описание условий и хода эксперимента (Experimental Conditions and Procedure)
	Результаты (Results)	<ul style="list-style-type: none"> – представление результатов (Presenting Results) (с использованием графиков и таблиц) (Using Figures/Graphs and Tables)
Обсуждение (интерпретация результатов) (Discussion) (Interpretation of Findings)		<ul style="list-style-type: none"> – анализ результатов на фоне имеющихся данных (Analysis of Results) – оценка результатов (Evaluation of Results) – сравнение полученных результатов с ожидаемыми результатами (Comparison of Findings with the Expected Findings)

Субжанр (Subgenre)	Тематическое предложение (Moves)
Заключение (Conclusion)	– описание значения результатов/ исследования (Description of the Significance of Results/Study) – общий вывод (General Conclusion) – рекомендации для дальнейшего исследования (Recommendations for Further Study)
Благодарность (Acknowledgment)	– благодарность за помощь в исследовании (Gratitude for Encouragement) – благодарность за финансовую поддержку (Gratitude for Support)
Библиография (References)	
Приложение (Appendices)	

Abstracting and Summarising. Theoretical Review

(Теоретические основы аннотирования и реферирования)

Основные понятия

Аннотирование и реферирование являются творческими процессами, суть которых состоит в осмыслении, анализе и оценке содержания оригинального текста с целью извлечения необходимых сведений. В результате аналитико-синтетической обработки информации получается вторичный текст, содержащий основные идеи первоисточника. К вторичным текстам относятся жанры аннотации и реферата.

Остановимся на их описании.

Реферат – это сжатое изложение основной информации первоисточника на основе ее смысловой переработки, строящееся в основном на языке оригинала и включающее фрагменты из первоисточника.

По цели (назначению) рефераты подразделяются:

- на библиографические рефераты;
- на рефераты для научно-популярных журналов;
- на учебные рефераты.

Выделяют следующие виды библиографических рефератов:

– **в зависимости от глубины свертывания, степени компрессии (сжатия) информации первичного документа и характера представления материала:**

- а) *информативный реферат* (реферат-конспект);
- б) *индикативный реферат* (указательный – краткий реферат, сходный с аннотацией).

Некоторые исследователи относят реферат-конспект и указательный реферат к *репродуктивному* виду реферата, то есть воспроизводящему содержание первичного документа. К продуктивному виду реферата, содержащему критическое или творческое осмысление реферируемого источника, относят *реферат-обзор* и *реферат-доклад*. Реферат-доклад, помимо анализа информации, приведенной в первоисточнике, дает объективную оценку состояния проблемы.

Информативный реферат определяется как реферат, содержащий в обобщенном виде все основные положения первичного документа, иллюстрирующий его материал, важнейшую аргументацию, сведения

о методике исследования, используемом оборудовании, сфере применения. Поскольку такой реферат способен «до некоторой степени заменять первичный документ» он оказывает большую помощь читателям, которые не могут воспользоваться оригиналом.

Индикативный реферат характеризуется отсутствием детальной фактографической информации, касающейся результатов и выводов исследования, и наличием множества ключевых слов и словосочетаний, отражающих названия разделов, глав, рубрик. Именно эта особенность индикативного реферата помогает читателю решить вопрос о целесообразности обращения к первоисточнику.

– **по цели реферирования** или по читательскому назначению:

- а) *общий (универсальный)*, рассчитанный на широкий круг читателей;
- б) *специализированный*, ориентированный на специалистов определенной области знания.

– **по количеству реферируемых первичных документов:**

- а) монографический реферат (по одному первоисточнику);
- б) обзорный реферат (на одну тему по нескольким источникам);

В рамках программы подготовки магистрантов по английскому языку рекомендуется написание *информативного монографического специального реферата* (объем – 1/8 от первичного текста) на основе информационной переработки профессионально-ориентированного (научно-технического) текста.

Построение текста реферата может иметь следующую композиционно-смысловую структуру:

1. Библиографическое описание (название статьи, выходные данные, сведения об авторе (авторах));

2. Тема;

3. Изложение основных вопросов, проблем, положений о которых говорится в первоисточнике;

4. Анализ самых важных, по мнению автора реферата, вопросов, перечисленных выше;

5. Выводы автора первоисточника по проблеме.

Аннотация, в отличие от реферата, является текстом, содержащим лишь перечисление главных вопросов первичного источника, указание на его тематику и структуру, при этом не допускающим цитирования.

Аннотация – это наискратчайшее изложение содержания первичного документа, дающее общее представление о теме и характеризующееся наличием языковых оценочных клише.

Аннотации классифицируют следующим образом:

– по содержанию:

- а) справочные;
- б) описательные (раскрывают тематику первичного текста, но не дают критической оценки);
- в) рекомендательные (оценивают первоисточник с различных точек зрения);

– по полноте охвата содержания аннотируемого документа и читательскому назначению:

- а) общие;
- б) специализированные.

Разновидностью специализированной аннотации является и *аналитическая* аннотация, характеризующая определенный аспект содержания первоисточника. Выделяют также *обзорную аннотацию*, которая содержит обобщенную характеристику двух и более документов, близких по тематике.

– по адресату:

- а) не для личного пользования;
- б) для себя;

– по форме:

- а) устные;
- б) письменные;

– по объему:

- а) краткие аннотации (обычно сводятся к характеристике первоисточника по одному аспекту);
- б) развернутые аннотации (более подробно представляют первоисточник);

– по наличию автора:

- а) неавторская аннотация, сопровождающая новую публикацию;
- б) авторская аннотация, написанная известным, авторитетным лицом или автором, не известным широкому кругу читателей.

При аннотировании научно-технического текста магистрантами рекомендуется написание *описательной общей аннотации*, представляющей собой 3–4 четких предложения, дающих представление о главной теме и перечне вопросов, затрагиваемых в тексте первоисточника.

В структуре аннотации выделяют следующие части:

1. Библиографическое описание (название статьи, выходные данные, сведения об авторе (авторах));

2. Тема;

3. Проблематика.

Таким образом, если **аннотация** лишь перечисляет вопросы, о которых идет речь в первичном тексте и отвечает на вопрос «*О чем говорится в первоисточнике?*», то **реферат** не только перечисляет эти вопросы, но и раскрывает их существенное содержание, отвечая на вопрос «*Что говорится в первоисточнике?*».

Наряду с традиционными жанрами вторичной информации – рефератом и аннотацией, рекомендуется написание так называемых **резюме-выводов**, или сжатых выводов, содержащих 2–3 четких, кратких, выразительных предложений, отражающих вывод, к какому пришел исследователь после прочтения статьи (текста) по специальности.

Рекомендации по написанию реферата и аннотации

При реферировании и аннотировании работа ведется по следующим направлениям:

- 1) выделение основной (главной) и отсечение второстепенной и не-существенной информации;
- 2) переработка (перефразирование) главной информации в краткую форму речевого произведения.

Для успешно выполнения поставленных задач следует придерживаться следующего **алгоритма**:

1. Просмотрите бегло первичный документ, определите общий смысл текста, опираясь на заголовки, графики, рисунки;
2. Прочитайте текст внимательно во второй раз для целостного восприятия информации, определите значение незнакомых слов по контексту и по словарю;
3. Определите основную тему текста;
4. Проведите смысловой анализ текста, выделяя абзацы (смысловые блоки, субтексты), содержащие информацию, которая раскрывает или подтверждает заглавие текста (основную тему); определите композиционное построение – структуру абзацев (дедуктивную – deductive, индуктивную – inductive, рамочную – closed-in, стержневую – pivotal);

Примечание. Проследить динамику изложения материала поможет анализ структуры абзаца или субтекста.

Абзац в научном тексте можно определить как относительно самостоятельный, графически выделенный посредством красной строки элемент текста, содержащий одну частную мысль или ее фрагмент. Классический абзац имеет абзацный зачин, главную абзацную фразу

(обобщение), содержащую ключевые слова или предложение, комментирующую часть, раскрывающую утверждение главной абзацной части. Заканчивается абзац выводом. Иногда абзацный зачин является главной фразой, а комментирующая часть занимает два или более абзацев и вывод выделяется в отдельный абзац. В этом случае можно говорить о структуре субтекста.

Субтекст – компонент связного текста, развивающий одну из основных тем и обобщающий темы нескольких абзацев, входящих в его состав.

В зависимости от местонахождения в абзаце (субтексте) **обобщающего предложения** (key sentence) выделяют:

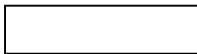
1) абзац (субтекст) с **дедуктивной** структурой – ключевое предложение находится на верхней границе абзаца (субтекста);

1) Модель *дедуктивного* (deductive) субтекста (абзаца)



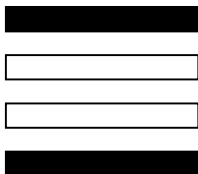
2) абзац (субтекст) с **индуктивной** структурой – заключительное предложение или заключительный абзац, содержащие обобщение, подводят итог содержанию всего смыслового блока (куска) и находятся на нижней границе абзаца;

2) Модель *индуктивного* (inductive) субтекста (абзаца)



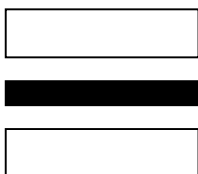
3) абзац (субтекст) с **рамочной** структурой – обобщение располагается в начале абзаца и в конце, при этом первое обобщение дублируется посредством перефразирования в конце смыслового куска;

3) Модель субтекста (абзаца) с *рамочной* (closed-in) структурой



4) абзац (субтекст) со **стержневой** структурой – ключевое предложение, содержащее обобщение, располагается в середине абзаца или в среднем абзаце субтекста;

4) Модель субтекста (абзаца) *со стержневой* (pivotal) структурой



В структуре текста можно выделить абзац, выполняющий функцию связки между абзацами (субтекстами). Такой абзац обычно состоит из одного предложения и называется **конструктивным**.

5. Установите средства межфразовой связи внутри абзаца (субтекста) для установления более точных его границ;

Примечание.

Предложения внутри абзацев могут быть связаны посредством:

- а) повторений терминов (repetitions);
- б) синонимов (synonyms);
- в) антонимов (opposites);
- г) местоимений (pronouns);
- д) использования разных частей речи с общим корнем (например: to depend – dependence)

е) союзов, союзных слов, местоименных наречий и наречий и т. д.

6. Распределите материал текста первоисточника на три группы по степени важности:

- а) наиболее важная информация;
- б) второстепенная информация;
- в) малозначительная информация, которую можно опустить;

7. Найдите ключевые предложения в абзацах (в начале, середине или конце), содержащих существенную информацию, составьте логический план (назывной, вопросный, тезисный) или информационный граф текста;

Примечание. Наиболее рациональной формой фиксации понятого главного содержания текста является составление плана.

План – краткая программа изложения содержания статьи (текста), содержащая последовательное изложение коротко сформулированных мыслей-заголовков, по которым можно получить представление о содержании и схеме построения первоисточника.

По структуре выделяют:

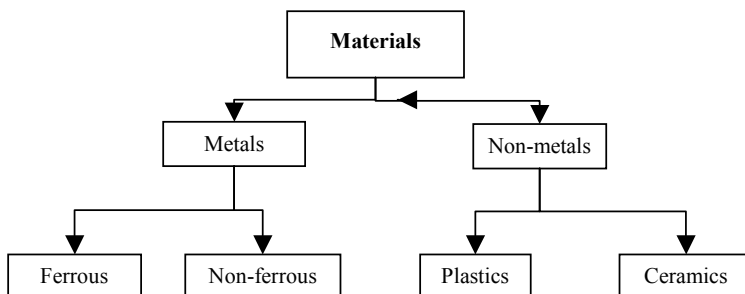
- 1) *простой план*;
- 2) *сложный план*, содержащий подпункты;
- 3) *развернутый*, содержащий не только перечисление основных идей, но и выдержки из текста;

По форме выделяют:

- 1) *назывной*, состоящий из назывных предложений (словосочетаний);
- 2) *вопросный*, в форме вопросов с использованием вопросительных слов;
- 3) *тезисный*, состоящий из утвердительных предложений.

Назывные предложения плана легче всего преобразовывать в реферативные предложения, формулирующие главную мысль каждого раздела.

Еще одним способом отражения структурной организации содержания первоисточника является составление информационного *графа* или графической репрезентации текста, основанной на визуальном моделировании смысловой структуры целого текста. Например, текстовая схема (граф) текста, содержащего информацию о классификации материалов, может иметь следующий вид:



8. Перефразируйте, используя клише и слова с обобщенно-абстрактным значением, пункты плана в краткие (реферативные) предложения, формулирующие главную мысль каждого смыслового блока и важнейшие доказательства, подкрепляющие эту мысль;

Примечание. Перефразирование (реферирование) может осуществляться по предложенным образцам:

X is **a material** that ... => The author describes X **as a material** that ...

X is described **as a material** that ...

X are **classified** into... => The author gives the **classification** of X.
X are divided into ...

X fall into ...

X is **important** ... => The author points out to the **importance** of X.

X is made **thoroughly**... => The author says about **thorough** X.

X **can** be described ... => It is said about the **opportunity** to describe X...

X is **bigger than** Y. => The author **compares** X and Y.

X **consists of** ... => It is said about the **construction** of X.

X **includes** ... The author describes the **composition** of X.

X **contains** ... The **design** of X is presented.

X **has**... There is
... **is also present.**

X increases ...	=> The author says about higher (increased) X .
X decreases ...	=> It is said about an increase in X / The author points out to lower (decreased) X . It is pointed out to a decrease in X .
There is a X ...	=> The author says about the availability of X ...
X is used for / in ...	=> It is said about the use of X for/in ... The use of X for/in ... is considered.
...	=> ...

9. Завершите обработку всех пунктов плана, соединив предложения при помощи средств связи, в цельный, логично построенный в соответствии со схемой-моделью жанра вторичный текст.

Стилевые и языковые характеристики реферата и аннотации

Реферат и аннотация как жанры научного стиля имеют следующие стилиевые характеристики:

– **обобщенно-отвлеченность** – в основе реферирования лежит использование приемов перефразы и обобщения:

а) *резюмирующего*, заключающегося в замене частного общим, видового понятия родовым, вскрытии общих признаков у ряда явлений для их объединения, сведении ряда явлений к их сущности, логическом развитии понятий, например замене одного признака другим, замене причины или следствие процессом и т. д.;

б) *выборочного*, означающего выделение одного наиболее типичного и показательного факта в качестве обобщенной характеристики положений материала;

– **логичность изложения** – в тексте прослеживается движение от простого к сложному, от старого знания к новому, от понятия к суждению и выводам. Кроме того, жанр реферата и аннотации имеют структуру, соответствующую модели жанра и соединение компонентов внутри текста достигается посредством многообразия средств межфразовой связи;

– **терминологичность** – термин – эмоционально-нейтральное слово (словосочетание), точно передающее название определенного понятия, относящегося к той или иной области науки и техники. Научно-технический текст содержит большое количество специальной терминологии, позволяющей наиболее четко и экономно излагать содержание данного предмета и обеспечивающей правильность понимания сути рассматриваемого вопроса. Отсюда вытекают такие особенности реферата и аннотации как, **однозначность, предельная краткость, ясность.**

Для языка и стиля реферата и аннотации характерно:

– преобладание слов с обобщенным, абстрактным значением (explanation-объяснение, description-описание, conditions-условия, estimation-оценка (результатов), etc.);

– наличие специального лексического аппарата – терминологии (AC generator-генератор переменного тока, electromotive force-электро-движущая сила, resistivity-удельное сопротивление, etc.);

– преобладание отглагольных имен существительных (determining-определение, implementing-внедрение, conducting-проведение, etc.);

– в глагольных формах преобладание настоящего простого (Present Simple), преимущественно в страдательном залоге; использование пассивных конструкций (The results of the experiment are presented. It is said about materials with high resistivity, etc.);

– активное использование повторов, лексических и грамматических, для обеспечения логико-смысловой связи между частями текста и отдельными фразами, например, личных, указательных, притяжательных и относительных местоимений; союзов и союзных слов и других средств связи (however-однако, besides-кроме того, thus-таким образом, etc.)

– употребление причастий и причастных оборотов;

– привнесение в текст клишированных конструкций, отсутствующих в первичном тексте (The experience of ... is summarized in the article. The methodology of ... is described in the paper., etc.);

– отсутствие субъективно-оценочной лексики.

Таким образом, соблюдение выше перечисленных особенностей помогает создавать тексты вторичных жанров аннотации и реферата в соответствии с требованиями, предъявляемыми к написанию текстов научного стиля, а, следовательно, эффективной текстовой деятельности.

Appendix V

Useful Language for Summarising

1. The title of the article	<p>The article is headlined...</p> <p>The extract under consideration is taken from the article named ...</p> <p>The headline of the article/paper I have read is...</p> <p>The article is called ...</p> <p>The subheading of the extract/ section/ chapter is ...</p>
2. The author of the article, where and when the article was published	<p>The author of the article is...</p> <p>The authors of the article are...</p> <p>The article is written by...</p> <p>It is published in ...</p>
3. The general topic of the article, the aim of it	<p>The main idea of the extract of the paper/ section / chapter is to...</p> <p>The extract of the paper/ section / chapter is about...</p> <p>The extract of the paper/ section / chapter is devoted to ...</p> <p>The extract of the paper/ section / chapter deals with...</p> <p>The extract of the paper/ section / chapter touches upon...</p> <p>The purpose of the extract of the paper/ section / chapter is to give the reader some information on...</p> <p>The aim of the extract of the paper/ section / chapter is to provide the reader with some material (data) on...</p>

	<p>The paper/ text under consideration is mainly focused on ... issues:...</p> <p>The paper/ text considers/ describes the following main issues: ...</p>
4. The contents of the article.	<p>The author starts / authors start by telling the reader that...</p> <p>The author writes (states, stresses, thinks, points out) that...</p> <p>The extract of the paper/ section / chapter describes...</p> <p>According to the text...</p> <p>First/ firstly, is/are discussed (described, shown, considered) in the paper/ text.</p> <p>The paper/ text begins with the discussion of ...</p> <p>The first part deals with ...</p> <p>In the first part the problem of ... is considered in detail.</p> <p>The first part concentrates/ focuses on ...</p> <p>The introductory part reviews ...</p> <p>Then/ Secondly ... is/ are analyzed (considered, reviewed).</p> <p>The author goes on to show that ...</p> <p>Also/ In addition the problem of ... is considered.</p> <p>Besides, some comments on ... are given.</p> <p>Then the author makes an attempt to show that ...</p> <p>The paper/ text also presents some data on ...</p> <p>The paper/ text also mentions the fact that ...</p> <p>The paper/ text also contains ...</p>

Окончание таблицы

	<p>Further the author reports/ says...</p> <p>The article goes on to say that...</p> <p>In conclusion...</p> <p>The author comes to the conclusion that...</p> <p>Summing up, the author points out that ...</p> <p>Summing up the discussion, the author emphasizes that ...</p> <p>Summarizing, the author says that ...</p> <p>To summarize, the author says that ...</p> <p>In conclusion, the author emphasizes that ...</p>
5. The most important points	<p>Much attention is paid to ...</p> <p>The authors pay much attention to....</p> <p>The extract of the paper/ section / chapter mainly focuses on ...</p>

Appendix VI

Means of Connection (Средства связи)

	Значение	Средство связи
1	Указание на порядковую последовательность мыслей и действий (сначала, потом, наконец)	First, at first, first of all, at the beginning, to begin with – во-первых, сначала, прежде всего; second, secondly – во-вторых; next, further, then – далее, затем; finally, lastly, at last, in the end – (и) наконец
2	Присоединение к высказыванию нового предложения, содержащего дополнительные замечания, или развивающее мысли дальше (кроме того, помимо того)	in addition – в дополнение (к сказанному); consequently – следовательно, вследствие этого; accordingly – в соответствии с этим; therefore – поэтому moreover – кроме того, более того; furthermore – далее, более того, кроме того, к тому же; also – кроме того, более того, а также; likewise, similarly – точно так же, аналогичным образом; besides – кроме того what is more – более того
3	Выражение противопоставления	however – однако; still – однако, тем не менее; yet – однако, однако же; on the contrary, in (by) contrast – и наоборот, напротив, в противоположность этому; conversely, alternatively – с другой стороны; on the one hand – с одной стороны; on the other hand – с другой стороны;

Окончание таблицы

	Значение	Средство связи
		nevertheless – тем не менее, несмотря на это, однако; otherwise – иначе, противном случае although – хотя
4	Указание на следствие, суммирование сказанного ранее	hence – отсюда; therefore – поэтому consequently, as a consequence thus – таким образом; as a result – в результате этого; in brief, in short, briefly, in a few words вкратце короче говоря; – вкратце; in sum, to sum up, to summarize – итак, суммируя сказанное выше, можно сказать, что...
5	Выражение ссылки на что-либо	according to, with reference to – согласно ..., в соответствии с ... as for – что касается... with respect to, with regard to, regarding – относительно ...
6	Выражение причины	because of, owing to, due to – из-за, благодаря; for this reason – по этой причине
7	Приведение примеров	for example, for instance – например as an example – в качестве примера

References

1. Вейзе А.А. Чтение, реферирование и аннотирование иностранного текста: учеб. пособие / А.А. Вейзе. – М.: Высш. шк. 1985 – 127 с.
2. Ридная Ю.В. Английский язык. Аннотирование и реферирование. Часть 1: методические указания для магистрантов технических специальностей/ Ю. В. Ридная – Новосибирск: Изд-во НГТУ. 2013 – 96 с.
3. Writing definitions // URL: https://owl.purdue.edu/owl/general_writing/common_writing_assignments/definitions.html (дата обращения: 17.11.20)
4. Master of Science Information and Technology // URL: <https://www.masterstudies.com/Master-of-Science-Information-and-Technology/USA/California-Lutheran-University/> (дата обращения: 17.11.20)
5. A brief history of Science/ 30th August 2019 // URL: <https://www.open.edu/openlearn/history-the-arts/history/history-science-technology-and-medicine/history-science/brief-history-science> (дата обращения: 17.11.20)
6. Brats B. History of Science-Modern Era // The daily star , March 01, 2011 / URL: <https://www.thedailystar.net/news-detail-175997?amp> (дата обращения: 17.11.20)

Audioscript

Module 1

60-Second Listening

Task 1.1 (p. 4)

Science

Science is one of the most important subjects we study at school. I loved it. I thought it was so interesting. Time in my science lessons went very quickly because I was always working on things and doing experiments. I liked all of the sciences, physics, biology and chemistry. I wish I continued studying science. I would love to be a scientist now. I think being a computer scientist would be great. Science is so important for our life and our world. All of the world's problems can be solved with science. We can go to different planets because of science. I hope governments pump lots of money into science so we have more and better scientists in the future. It's interesting to think about what future science will be like.

60-Second Listening

Task 2.1 (p. 9)

Physics

I don't know how people understand physics. I think it's a fascinating subject and really wish I understood more. Physics seems to explain everything about our world and our universe. It's as though physics is the key to unlocking all of our world's mysteries. I really enjoyed studying physics at the beginning. It was interesting then. But then it got difficult and I couldn't understand the formulae. I have a lot of respect for physicists. They seem to be able to understand lots of really difficult things. Without them, we would still be living very basic lives. Physicists have sent people to the Moon. Their research has led to all of our modern technology. I always read fewer and fewer students are choosing to study physics. This is a shame.

Module 2

60-Second Listening

Task 1.1 (p. 17)

Studying

Love it or hate it, studying is one of the most important things we do in life. We all start school around the age of four and then it's study, study, study. Some of us are good at it and like it. Some people even become life-long learners and study into their old age. I know one woman who's over seventy and is doing her fifth Master's degree. Other people hate studying. Many people leave school at the age of 15 or 16 and get a job. They like the idea of getting money and not having homework. The truth is, however, studying is one of the best ways to make sure you do well in life. The more you study, the more qualifications you have and the better job you can get. I really think everyone would love studying if they studied something interesting.

Task 2.1 (p. 25)

Students

Being a student is a good life. I don't think most students understand this. A lot of students complain they have no money and too much homework. They never complain that they have loads of free time, don't have to go to work and have really long holidays. When students finish being students and go to work, they understand how good it is to be a student. Being a student at high school can be tough. You have to study boring things and deal with things like bullying. Going to college or university is when the fun starts. Just a few hours of classes a week and lots of student parties. I'd love to be a student again. I know many people who'd like to be full-time students forever. All you need is a bit more cash.

60-Second Listening

Task 2.13-2.15 (pp. 30–31)

Online MS program in Information Technology

After earning an undergraduate degree, you might be ready to begin your career. Alternatively, you can choose to continue your education by

enrolling in graduate school and earning your master's degree. This provides a more advanced understanding of your field and allows you to qualify for higher positions.

What is an Online MSc in IT? The field of information technology focuses on the database and technology needs of a business. Courses involve computer science and engineering, information analysis and management, and network administration. Because a large part of IT incorporates offering support to others, courses may also focus on communication, cooperation, or management. Through your studies, you should be completely comfortable creating and maintaining a corporate database or network.

Holding a master's degree often makes it much easier to enter and succeed in a career. Students often benefit from gaining qualifications for advanced positions and earning a higher salary than would be possible otherwise.

Before enrolling in a Master of Science in IT program, it is important that you research the cost of earning a master's degree. The specific school and program you choose will influence tuition greatly. Additionally, choosing to study online will typically reduce the cost somewhat.

While it may not seem like it at first, there are many different positions available in the field of IT. You probably initially think of the IT support workers who work diligently to help the entire staff of a business with their technology challenges. It is also possible to work as a network engineer or system developer to create a database or network for a corporation. Database administrators are tasked with maintaining and managing these systems. Finally, there is also work on the analysis side of information technology that involves examining business information and compiling useful reports.

Begin your career in information technology. Search for your program below and contact directly the admission office of the school of your choice by filling in the lead form.

60-Second Listening

Task 3.1 (p. 32)

Research

Research is a very important thing. Without research, we'd have no new products. Our food would be more dangerous to eat. And we'd never go to the moon. I'd like to see my government spend a lot more money on research. Especially on research into diseases. Scientists have been research-

ing into AIDS and cancer for years and still have not found cures. Research into technology is also important. There seems to be loads of research into information and computer technology. It's amazing how quickly technology is changing. We really need to spend more to research how global warming is affecting our planet. This could be the most important research scientists ever do. Research to save the planet.

Module 3

60-Second Listening

Task 1.1 (p. 39)

Literature

Literature is one thing that makes me very happy. I have loved books of all kinds since I was very small. I don't know what I would do in life without novels, poems and plays. It's amazing how literature can change your life. It educates you, makes you happy, makes you sad, inspires you and so much more. I think I'd be a completely different person without it. Literature has been a big influence on my life – perhaps as much as my friends. I think literature is really powerful. It can help us understand other cultures. Recently, I have read a lot of Indian literature, in English, of course. The books I read have totally changed my image of India and Indians. My experience has really made me want to read more books from other countries.

60-Second Listening

Task 2.1 (p. 44)

Plagiarism

OK, everyone, today's topic is plagiarism. If you don't know what that is, it's copying stuff from books or the Internet without letting people know where the stuff came from. Lots of people do it nowadays because copy and paste is so quick and easy. It's OK to copy and paste small chunks of someone's work but you must make it clear it's copied, and write from whom you copied it or where you got it. Put the text in quotation marks and say something like, "according to..." and then put the writer's name. The best thing is to go to the Internet and search for, "how to cite sources". EnglishClub.com has good information on how to do this. The best thing is to make sure what you write is really from your head.

60-Second Listening

Task 3.1 (p. 46)

Electricity

Electricity is one of the most important inventions ever. It is the thing that powers the Earth. If there was no electricity, we'd be back in the dark ages. Few people stop and think just how amazing electricity is. With the flick of a switch, you can power almost anything. Think about what would happen if there was no electricity. We'd have no TV, no computers, no traffic signals. It would be like going back to living in caves. There are a few negative points about electricity, of course. Number one, it's dangerous. Thousands of people die each year from electrocuting themselves or in electrical fires. And number two, it isn't good for the environment. Most electricity comes from burning coal and that creates greenhouse gasses.