<p style="text-align:center">**Английский язык для специальных целей. Биология–3**

Course Syllabus for «English for biologists–3»</p>

Developer	A.V.Zaharova
No. of credits	3
Contact hours	52
Independent study (hours)	62
Year of study, degree programme	The second year of study,1–3 modules
Study format	Full-time

Abstract

The course «English for biologists–3» is centered on the professional language and competences that are required for successful communication in the field of Biology. The course aims to advance language proficiency to the level that enables students to listen to lectures on specific biology-related issues, participate in classroom discussions, make presentations, write reviews of academic articles and descriptions of complex processes as well as perform adequately in other academic and professional contexts. The course covers a number of topics varying from the cell structure to biotechnology. The prior attention is given to development of professional vocabulary as well as reading, writing and speaking skills. This course is originally designed for students of B2+ CEFR level (HSE Scale 60-69) aspiring to excel in English for professional purposes.

<h2 style="text-align:center">Learning Objectives</h2>

This course aims to improve students' command of English for professional and academic communication in the area of cell and molecular biology as well as develop language skills consistent with the Common European Framework of Reference for Languages (CEFR), B2+ level (HSE Scale 60-69). Students will expand specific vocabulary that will help them express the biology-matter content in English and use what they learn in the classroom right away in their studies. Moreover, the course facilitates students' performance in academic and professional contexts by developing listening, reading, writing and speaking skills.

<h2 style="text-align:center">Learning Outcomes</h2>

Upon completing the course, students will be able to:

- use a broad range of specific vocabulary in professional and academic contexts,

- understand a wide variety of texts including specialised academic or professional publications,

- understand standard spoken language, lectures and presentations on biology-related topics common for academic or vocational contexts,

- give clear, detailed descriptions and presentations on topics related to cell and molecular biology, expanding and supporting ideas with subsidiary points and relevant examples,

- answer questions about biology-related topics clearly and in detail;

- express an attitude, opinion or idea using professional language;

- write detailed descriptions of complex processes,

- write reviews of scientific articles with appropriate highlighting of significant points and relevant supporting details.

Course Contents

Topic 1. What is Biology?

Sub-topics: characteristics of life, biology as a science, modern biology, aspects of biology

Vocabulary: reproduction, growth and development, feeding, respiration, excretion, responsiveness, homeostasis, evolution, scientific method, experiment, hypothesis, independent, dependent, and controlled variables, model

Grammar: Tense Review

Reading: topic specific texts / skimming and scanning, visualising

Listening: topic-related presentations and interviews / understanding opinions and argumentation

Speaking: describing systems, asking and answering questions

Writing: process diagram description

Topic 2. Cell

Sub-topics: Cell Theory, typical animal and plant cells, cell division, microscopes

Vocabulary: chromosomes, homologous pairs, metabolism, cytoplasm, chlorophyll, cell cycle, meiosis, reproduction, gamete, nucleus, mutation, compound light microscope, magnification and resolution, the electron microscope, the transmission electron microscope

Grammar: countable and uncountable nouns, noun phrases

Reading: topic specific texts / skimming and scanning, restating

Listening: topic-related presentations / separating facts from opinions

Speaking: giving definitions, stating facts and opinions

Writing: flow-chart description

Topic 3. Molecular biology of the gene

Sub-topics: DNA structure, chromosomes

Vocabulary: a polymer of nucleotides, the double helix, complementary base pairing, mitosis, meosis, nucleosomes, chromatin, centromere, telomeres

Grammar: relative clauses

Reading: topic-related texts / skimming and scanning, answering questions

Listening: topic-specific lectures / understanding standard and rhetorical questions

Speaking: classifying, categorizing, exemplifying; making presentations

Writing: laboratory safety and guidelines: giving short responses

Topic 4. Inheritance

Sub-topics: variation, Down's syndrome and genetic screening, genetic counselling

Vocabulary: genetic variation, phenotypic variation, chromosome mutations, gene mutations, genetic screening, amniocentesis

Grammar: passives

Reading: topic-specific texts / recognizing differences between opinions

Listening: topic-related lectures / recognising numbers and fractions

Speaking: clarifying, paraphrasing

Writing: data documentation: recording data

Topic 5. Nervous and hormonal coordination

Sub-topics: nerves and hormones, setting up a nerve impulse

Vocabulary: sensitivity, nervous system, endocrine system, nerve impulses, resting potential, action potential, ion channels and action potentials

Grammar: modal verbs, comparing and contrasting

Reading: topic-specific texts / skimming and scanning, summarising

Listening: topic-related discussions / understanding differences in opinions

Speaking: comparing and contrasting

Writing: data analysis (1): graph description

Topic 6. Evolution

Sub-topics: theories of evolution, Darwin's theory, natural selection, artificial selection, human evolution: primate ancestors

Vocabulary: mechanism of evolution, origin of species, stabilising selection, directional selection, disruptive selection, cultivation, inbreeding, outbreeding, adaptation

Grammar: conditionals

Reading: topic-related texts / answering questions

Listening: topic-specific lectures / recognising emphatic speech

Speaking: giving emphasis, being emphatic

Writing: data analysis (2): table description

Topic 7. Biotechnology

Sub-topics: genomics, recombinant gene techniques, applied immunology, development of pharmaceutical therapies and diagnostic tests

Vocabulary: modification, cell and tissue culture, genetic engineering, bioinformatics,

Grammar: hedging, phrasal and prepositional verbs

Reading: topic-related texts / skimming and scanning, answering questions

Listening: topic-specific lectures / understanding the argument

Speaking: arguing and persuading

Writing: reviews of scientific articles

Assessments

The final grade is composed of the following parts: 25% Written Assessment (WA) +20% Oral Assessment (OA) + 25% student Independent Work Assessment /online (IWA) + 30% Final Assessment (FA).

Only overall grade is rounded.

Written assessment elements can be taken during the course of 10 days after they took place if a student has a medical certificate. The 10-day period starts from the last day of the medical leave. This, however, does not apply to oral assessment and individual work assessment (elements cannot be retaken).

The Final Assessment may be taken again during the retake period. The first retake follows the structure of the Final Assessment. The second retake is conducted using unique Testing and Assessment Materials which cover the materials of the whole course. The grade for the second retake corresponds with the grade for the entire course.

Written assessment

Written assessment includes *one* reading test, *one* listening test, *five* vocabulary and grammar tests and *one* written work (a process diagram description). The test tasks can be of different types. The elements of written assessment cannot be retaken. Written assessment is conducted in the classroom and cannot be part of homework.

GRAPH, TABLES, MAPS ASSESSMENT CRITERIA (max 10 points)
Recommended word count – 150

Task Response (max 3 points)

3 points – the student fully addresses all parts of the task: clearly highlights all the key features, numbers, dates and trends, supports all the key features with data, summarises the information by selecting and reporting on the main features and makes comparisons appropriately;

2 points – the student addresses all parts of the task although some parts may be more fully covered than others: clearly highlights most of the key features, supports most of the key features with data, by selecting and reporting on some features and makes some comparisons;

1 point – the student responds to the task only in a minimal way or the answer is tangential; the format may be inappropriate: the student highlights one key feature, supports one key feature with data, summarises the information but does not make comparisons;

0 points – the student does not adequately address any part of the task: does not highlight any key features/ does not summarise the information/ does not make comparisons.

Coherence and Cohesion (max 2 points)

2 points – the student writes an overview paragraph, uses a variety of linking devices appropriately, organises information and ideas logically, writes a relevant introduction, uses paragraphing sufficiently and appropriately;

1 point – the student writes an overview paragraph, uses a limited number of linking devices, writes an irrelevant introduction and does not use paragraphing sufficiently;

0 points – the student writes an overview paragraph, does not organise information and ideas logically, there is no introduction, the student fails to use linking devices appropriately.

Lexical Resource and Register (max 2 points):

2 points – the student uses most active vocabulary items appropriately and makes no mistakes, uses a wide range of subject-specific vocabulary including some advanced lexical items, but there may be 1 inaccuracy;

1 point – the student uses only 3-4 active vocabulary items, uses a sufficient range of subject-specific vocabulary, but may make 1 mistake in spelling, word formation or word choice;

0 points – the student uses no active vocabulary items, uses basic vocabulary with very limited control of spelling, word formation and word choice, makes 2 and more lexical or spelling mistakes.

Grammatical Range and Accuracy (max 2 points):

2 points – the student uses a wide range of grammar structures without mistakes;

1 point – the student uses basic grammar structures and/or makes 1 grammar mistake;

0 points – the student makes more than 2 grammar mistakes which severely impede understanding.

Level/track specific criteria (max 1 point)

1 point – All content is relevant to the task and the target; a reader is on the whole informed.

0 points – The student does not make a relevant choice and does not justify the decision with evidence.

Listening, reading, grammar and vocabulary tests are assessed as follows:

Grade	10	9	8	7	6	5	4	3	2	1	0
% fully completed tasks at home/in the classroom/online work	100 - 96%	95 - 91%	90 - 86%	85 - 78%	77 - 71%	70 - 61%	60 - 51%	50 - 36%	35 - 21%	20 - 1 %	0%

Answers containing spelling mistakes are considered incorrect.

Oral assessment

Oral assessment includes *one* presentation with a Q&A session and *one* dialogue. The elements of oral assessment cannot be retaken. Oral assessment is conducted in the classroom and cannot be part of homework.

PRESENTATION ASSESSMENT CRITERIA (max 10 points)

If the content of the presentation does not relate to the topic, a student receives "0" for the whole presentation.

Task Response (max 3 points):

3 points – the student fully addresses all parts of the task: the presentation corresponds to the chosen topic; it is clearly divided into introduction, main body and conclusion, all content points are covered; introduction contains the purpose and the plan of the presentation, each part of the main body has an explicit pattern of organisation (illustration, cause and effect, comparison, definition, etc.); conclusion includes both summary and the final statement and rounds the presentation of appropriately; presentation contains appropriate references in APA style in speech and slides; various coherence devices are used;

2 points – the student addresses all parts of the task although some parts may be more fully covered than others: the presentation partially corresponds to the topic, it is clearly divided into introduction, main body and conclusion and the parts of the presentation are connected with linking devices; presentation contains appropriate references in APA style in speech and slides;

1 point – the student responds to the task only in a minimal way or the answer is tangential, the format may be inappropriate: the presentation partially corresponds to the chosen topic, not all the content points are covered it is not clearly divided into introduction, main body and conclusion; presentation is free from logical fallacies; presentation does not contain appropriate references in APA style in speech and slides;

0 points – the student does not adequately address any part of the task: the presentation is not divided into introduction, main body and conclusion and the parts of the presentation are not connected with linking devices; presentation does not contain appropriate references in APA style in speech and slides.

Language Use (max 3 points):

3 points – the speaker uses an appropriate amount of academic vocabulary, terminology is relevant to the subject, synonyms are used to avoid repetitions, the hedging strategies are applied when applicable, the speaker uses collocations and advanced grammar when needed, pronunciation and speech flow are natural, occasional vocabulary and grammar mistakes in speech causing no difficulties for the audience; texts on slides have no vocabulary and grammar mistakes; the speaker naturally fills in the pauses caused by breakdowns of different nature;

2 points – the speaker complies with academic register, the speech is characterized by fluency and adequate pace; the speaker does not use collocations, omits vocabulary and grammar mistakes that sometimes cause difficulties for the audience, and/or there are 1-2 vocabulary and/or grammar mistakes on slides; the speaker naturally fills in the pauses caused by breakdowns of different nature;

1 point – the speaker demonstrates limited language resource; the vocabulary and grammar are generally appropriate with a few non-impeding inaccuracies; the speaker fills in the pauses caused by breakdowns of different nature with effort;

0 points – the speaker demonstrates poor language resources, omits vocabulary and grammar mistakes that cause serious difficulties for the audience, and the speaker does not fill in the pauses.

Manner of Delivery (max 2 points):

2 points – the presenter speaks with confidence maintaining a certain level of dynamics and keeping an appropriate posture and body language, maintains the adequate level of eye contact, uses stress, intonation and pausing appropriately; the presentation is given without reading off the slides or paper within the given time limit; the presenter makes 1-2 pronunciation mistakes in words of common use causing no difficulties for the audience, when answering questions; the speaker interacts with ease and responds appropriately;

1 point – the presenter makes 3-4 pronunciation mistakes causing difficulties for the audience and/or the presenter uses stress, intonation and pausing with limited control causing some difficulties for the audience; the presentation is given without reading off the slides or paper, when answering questions; the speaker interacts with effort or responds inappropriately; the speaker delivers the content within the given time limit;

0 points – the presenter makes 5 and more pronunciation mistakes in words of common use causing difficulties for the audience; the speaker does not interact with the audience; the presentation is given with reading off the slides or paper; the presentation does not fit the time limit.

Visual Aids (max 2 points):

2 points – the visuals are prepared in a certain style consistent throughout the presentation and well readable (font, color); each visual has a heading relevant to the overall theme of the presentation, conforming to the academic register; each visual contains only key words and phrases without complete sentences; presentation as a whole has an adequate balance of graphic and verbal information;

1 point – the visuals are well readable (font, color), contain both complete sentences and key words and phrases, presentation has a disbalance of graphic and verbal information;

0 points – the visuals are not well readable, and do not conform to the academic register.

DISCUSSION IN A Q& A SESSION FORMAT ASSESSMENT CRITERIA
(max 10 points)

Task Response (max 3 points)

3 points – the student fully addresses all parts of the task: the student presents a fully developed position in answer to the question with relevant, fully extended and well supported ideas; content corresponds to the topic of the discussion;

2 points – the student addresses all parts of the task although some parts may be more fully covered than others: the student presents a relevant position although the conclusions may be unclear or repetitive; content corresponds to the topic of the discussion;

1 point – the student responds to the task only in a minimal way or the answer is tangential: presents some ideas but they may be repetitive, irrelevant or not well supported (attitude is not expressed, and/or the arguments are not fully developed or extended); content is partially relevant to the topic;

0 points – the student does not adequately address any part of the task; the student does not express a clear position; the student presents few ideas, which are largely undeveloped or irrelevant.

Coherence and Cohesion (max 2 points)

2 points – the student applies logic when organising ideas, effectively uses a wide range of cohesive devices, introductory constructions, makes the points clearly but briefly;

1 point – the student applies logic when organising ideas, but there might be an occasional breach in logic, cohesive devices are inadequate, repetitive, under- or overused;

0 points – the student does not apply logic when organising ideas, there are no linking devices, introductory constructions and/or they are used inappropriately.

Lexical Resource and Register (max 2 points)

2 points – the student uses a wide range of appropriate vocabulary attempting to use some advanced lexical items, phrases useful for the discussion development;

1 point – the student uses appropriate but limited vocabulary; phrasal verbs and/or collocations are used inappropriately;

0 points – the student's vocabulary is too limited to comment on the topic, numerous mistakes impede understanding, active vocabulary is not used or used inappropriately.

Grammatical Range and Accuracy (max 2 points)

2 points – the student uses a wide range of grammar structures;
1 point – the student uses basic grammar structures and may make occasional mistakes which do not impede communication;
0 points – the student makes numerous grammar mistakes which impede communication.

Fluency, pronunciation (max 1 point)

1 point – the student's speech is smooth and fluent; there might be some minor pronunciation mistakes but they don't impede communication; intonation is appropriate; all sounds are articulated clearly;

0 points – the speech is slow; it takes the student time to find words; he/she fumbles the words and ideas and/or makes numerous pronunciation mistakes which impede communication; intonation is not appropriate; some sounds are articulated indistinctly.

DIALOGUE ASSESSMENT CRITERIA (max 10 points)

Task Response (max 3 points)

3 points – the student fully addresses all parts of the task: initiates the conversation, shares opinions, demonstrates active listening and questioning skills, responds to questions; presents a fully developed position in answer to the question with relevant, fully extended and well supported ideas; the student finds common ground, presents logical arguments, supporting evidence and examples, makes comments and draws conclusions, shows the interest in what another participant says; content corresponds with the topic of the dialogue;

2 points – the student addresses all parts of the task although some parts may be more fully covered than others: the student takes an active part in the dialogue, shares some ideas, does not always hear the thoughts and ideas of the partner; presents a relevant position although the conclusions may be unclear or repetitive, gives arguments, some of which are not fully developed, extended or supported;

1 point – the student responds to the task only in a minimal way: the student is not an active participant of the dialogue, rarely shares ideas, does not propel the conversation; presents a position but it is unclear and/or the arguments are not fully developed, extended or supported; presents some main ideas but these are difficult to identify and may be repetitive, irrelevant or not well supported;

0 points – the student does not adequately address any part of the task: the student is rather passive, does not share any ideas or answer questions; does not express a clear position.

Coherence and Cohesion (max 2 points)

2 points – the student applies logic when organising ideas, effectively uses a wide range of cohesive devices, introductory constructions, etc., makes the points clearly but briefly, allows the partner to finish without interrupting, encourages the partner to speak by inviting him/her to give his/her opinion, shows agreement or disagrees politely;

1 point – the student applies logic when organising ideas but there might be an occasional breach in logic, cohesive devices are inadequate, repetitive, under- or overused, the student sometimes talks over the other speaker, disagrees harshly, dominates the conversation;

0 points – the student does not apply logic when organising ideas, there are no linking devices, introductory constructions and/or they are used inappropriately.

Lexical Resource and Register (max 2 points)

2 points – the student uses a wide range of appropriate vocabulary including some advanced lexical items; the student uses appropriate phrases for better dialogue development;
1 point – the student uses appropriate but limited vocabulary; phrasal verbs and/or collocations are used inappropriately;

0 points – the student's vocabulary is too limited to comment on the topic; numerous mistakes impede communication; active vocabulary is not used or is used inappropriately.

Grammatical Range and Accuracy (max 2 points)

2 points – the student uses a wide range of question forms and other grammar structures accurately, may make 1 minor mistake which does not impede communication, can correct the mistake;
1 point – the student uses a variety of grammar structures and may make 2 mistakes which could impede communication;
0 points – the student makes numerous grammar and stylistic mistakes which impede communication.

Fluency, pronunciation (max 1 point)

1 point – the student's speech is smooth and fluent, there might be some minor pronunciation mistakes but they don't impede communication; intonation is appropriate; all sounds are articulated clearly;

0 points – the speech is slow, it takes the student time to find words; he/she fumbles the words and ideas and/or makes numerous pronunciation mistakes, which impede communication; intonation is not appropriate; some sounds are articulated indistinctly.

Independent work assessment

Independent work includes activities that students do at home, in the classroom and online. The elements of independent work cannot be retaken.

Grading scale:

Grade	10	9	8	7	6	5	4	3	2	1	0
% fully completed tasks at home/in the classroom/online work	100 - 96%	95 - 91%	90 - 86%	85 - 78%	77 - 71%	70 - 61%	60 - 51%	50 - 36%	35 - 21%	20 - 1 %	0%

A fully completed task means that an assigned task meets the deadline and all the requirements.

Final Assessment

The final assessment is a test that includes three parts: *one* reading task, *one* listening task and *one* writing task (a review of some article).

Answers containing spelling mistakes are considered incorrect.

REVIEW ASSESSMENT CRITERIA (max 10 points)
Recommended word count – 250-300

Task Response (max 3 points)
3 points – the student fully addresses all parts of the task (writes a title and a catchy introduction which identifies the reviewed item, gives a complete and fair description of the item, makes valid recommendations in conclusion); presents a fully developed position in answer to the question with relevant, fully extended and well supported ideas (presents a thorough discussion);

2 points – the student addresses all parts of the task although some parts may be more fully covered than others (writes a title and a relevant introduction, gives a narrow description, makes valid recommendations in conclusion); presents a relevant position although the conclusions may be unclear or repetitive; presents relevant main ideas but some may be inadequately developed/unclear;

1 point – the student responds to the task only in a minimal way or the answer is tangential; the format may be inappropriate: the student does not write a title but writes an introduction, gives a short description of the item, makes invalid recommendations in conclusion; the student presents a position but it is unclear; presents some main ideas but they are difficult to identify and may be repetitive, irrelevant or not well supported;

0 points – the student does not adequately address any part of the task: the student does not write an introduction, presents undetailed arguments, neither presents the personal impression nor the verdict; does not express a clear position; presents few ideas which are largely undeveloped or irrelevant.

Coherence and Cohesion (max 2 points)

2 points – the student writes a clearly structured objective review on the item, uses a variety of linking devices which connect the ideas appropriately, organises information in a logical order, uses paragraphing sufficiently;

1 point – the student writes a poorly structured review, uses a limited number of linking devices, does not use paragraphing sufficiently;

0 points – the student does not organise information and ideas logically, fails to use linking devices appropriately or repeats them.

Lexical Resource and Register (max 2 points)

2 points – the student uses a wide range of vocabulary specific to this topic without repetitions, makes 1 lexical or spelling mistake, the review is written in the appropriate register;

1 point – the student uses a limited range of vocabulary, fails to use active vocabulary items, makes 2 lexical or spelling mistakes, the student uses the appropriate register;

0 points – the student uses basic vocabulary, makes 3 or more lexical / spelling mistakes, the student uses an inappropriate register.

Grammatical Range and Accuracy (max 2 points)

2 points – the student uses a variety of complex grammar structures and makes 1 grammar mistake;

1 point – the student uses basic grammar structures and makes 2 grammar mistakes;

0 points – the student makes numerous grammar mistakes which impede understanding.

Punctuation (max 1 point)

1 point – the students may make 1-2 punctuation errors;
0 points – the students makes more than 2 punctuation errors.

Period of Final Assessment: the final exam is held in class within 10 days before the exam period online on MS Teams platform.

The release of examination papers: during the session.

The exam consists of 3 parts: *Listening (30%), Reading (30%)* and *Writing* (40%) respectively in the total mark for the exam. 0 points in case of cheating.

Retaking exams: till the 15th of October 2022.

Time limit: 80 minutes online/offline.

Tasks complexity: B2.

Exam structure:

1.	*Listening (L)*	Listen to the text and complete the tasks 1-10.	max. 10 points
2.	*Reading (R)*	Read the text and complete the tasks 1-10.	max. 10 points
3.	*Writing (W)*	Write a review/report.	review assessment criteria/ report assessment criteria

Grading formula: $L*0,3+R*0,3+W*0,4 = 10$

<u>Note</u>

Depending on the epidemiological situation the final test is held in class during the session week or online on Zoom or MS Teams platforms. Students must log in using their first name and surname. If a student connects to the videoconferencing session late, the time allocated for the element of assessment may be extended at the examiner's discretion (p. 34 of Regulations for Interim and Ongoing Assessments of Students at National Research University Higher School of Economics).

The exam is conducted in written form online with proctoring.

Taking a break during the Exam is not allowed.

To take the exam, a student should:

- check the operation of the webcam, microphone, headphones or speakers, the speed of the Internet (for the best results, it is recommended to connect the computer to the network via a cable);
- prepare the necessary items for the exam tasks (pens, A4 paper for a draft);
- disable other applications in the task manager of the computer, except for the platform (Zoom or MS Teams).

The student provides the necessary conditions for the exam:

• sufficient level of illumination;

• low noise level;

•absence of interference with video and audio signal transmission;

• a fully operational webcam (including built-in laptop cameras);

• a fully operational microphone (including built-in laptop cameras);

• a permanent and stable Internet connection with a data transfer rate of at least 5 Mbps.

During the writing part of the exam, it is prohibited to:

• turn off the webcam and microphone; reduce its level of sensitivity to sound;

• use auto-correct functions, notes, textbooks, other educational materials;

• leave the desk area during the Exam (leave the visibility zone of the webcam);

• use headphones, headsets for any other reason than to complete the Listening section of the exam;

• use "smart" gadgets (smartphone, tablet, etc.);

• involve another person to help with the Exam, talk with another person during the Exam;

• read tasks out loud.

In the event of a long-term communication failure with the Zoom or MS Teams platform during the exam, the student must record the fact of the loss of communication with the platform (take a screenshot/photograph of the entire screen so that the time and the application/web browser window are visible, get a response from the Internet provider) and report the problem to the office of the student's Program and to the teacher (in one email).

<u>Note:</u>

According to part 33 of Regulations for Interim and Ongoing Assessments of Students at National Research University Higher School of Economics «…. The use of materials not permitted by this list, attempts to communicate with other students or other individuals (e.g., through electronic means of communication), unauthorized movement in the examination room, having electronic means of communication that are not

allowed by the teacher, intended disconnection from the video conference or switching browser tab, when it is clear that the teacher forbids the action, and other violations of examination procedure constitute ground for the end of exam for the particular student (student's removal from the examination room, disconnection from the videoconference, etc.) with a subsequent "0" grade in the examination grade column.

Interim assessment

0.250   Written assessment

0.200   Oral assessment

0.250   Independent work assessment

0.300   Final assessment

<div align="center">Sources</div>

Recommended Core Bibliography

Pollard T.D., Earnshaw W.C. (2017) Cell Biology. Elsevier. 978-0-323-34126-4 [Электронный ресурс]

https://doi.org/10.1016/C2014-0-00272-9

Recommended Additional Bibliography:

Hine R. (2006) Oxford Dictionary of Biology. Oxford University Press. [Электронный ресурс]

https://studentsbook.net/catalog/angliyskiy_yazyk/slovari/spetsializirovannye_slovari

Berry, R. (2018). English Grammar : A Resource Book for Students (Vol. 2nd edition). [Place of publication not identified]: Routledge. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&site=eds-live&db=edsebk&AN=1753147

Equipment of the classroom:

− a set of demonstration equipment: personal computer / laptop, a multimedia projector with audio/video, a projection screen, an interactive whiteboard, a video panel, and other means of demonstrating educational content. It is allowed to use a portable set of demonstration equipment for conducting classes.
− availability of wireless Internet access via Wi-Fi network.

Online platforms for distance learning / communication:

− Smart LMS;
− Microsoft Teams.

Corporate access is available to the instructors and students when using HSE corporate e-mail addresses.

Organization of Studies for Persons with Limited Mobility and Disabilities

If necessary, learners with limited mobility or a disability (as per his/her application), as well as per his/her individual rehabilitation programme, may be offered the following options for receiving learning information with due consideration of his/her individual psycho-physical needs (e.g., via eLearning studies or distance technologies):

- *for persons with impaired vision*: enhanced fonts in hard copy documents; e-documents; audio files (transfer of study materials to an audio-format); hard copy documents with the use of Braille; individual consultation with a facilitated communicator; individual assignments and mentoring;

-for persons with hearing impairments: in hard copy; e-documents; video materials with subtitles; individual consultation with a facilitated communicator; individual assignments and mentoring;
- *for persons with a muscular-skeleton disorder*: in hard copy; e-documents; audio-files, individual assignments and mentoring.

Sample tasks:

Presentation

You are going to make a presentation on a specific topic. You should introduce the topic, give 1-2 main details and give a conclusion.

After the presentation, take questions from the audience and respond giving more details into your topic.

When watching other presentations, you should ask 2-3 follow-up questions.

OR

You are going to make a presentation on the current project you are involved in. You should introduce the main idea, provide 1-2 examples of its application and describe the current status of the project.

After the presentation, take questions from the audience and respond giving more details into your topic.

When watching other presentations, you should ask 2-3 follow-up questions.

Review (article)

Read the article below and write a review (300-350 words).

Engineers harvest WiFi signals to power small electronics

Date: May 18, 2021

Source: National University of Singapore

With the rise of the digital age, the amount of WiFi sources to transmit information wirelessly between devices has grown exponentially. This results in the widespread use of the 2.4GHz radio frequency that WiFi uses, with excess signals available to be tapped for alternative uses.

To harness this under-utilised source of energy, a research team from the National University of Singapore (NUS) and Japan's Tohoku University (TU) has developed a technology that uses tiny smart devices known as spin-torque oscillators (STOs) to harvest and convert wireless radio frequencies into energy to power small electronics. In their study, the researchers had successfully harvested energy using WiFi-band signals to power a light-emitting diode (LED) wirelessly, and without using any battery.

The research was carried out in collaboration with the research team of Professor Guo Yong Xin, who is also from the NUS Department of Electrical and Computer Engineering, as well as Professor Shunsuke Fukami and his team from TU. The results were published in *Nature Communications* on 18 May 2021.

Converting WiFi signals into usable energy

Spin-torque oscillators are a class of emerging devices that generate microwaves, and have applications in wireless communication systems. However, the application of STOs is hindered due to a low output power and broad linewidth.

While mutual synchronisation of multiple STOs is a way to overcome this problem, current schemes, such as short-range magnetic coupling between multiple STOs, have spatial restrictions. On the other hand, long-range electrical synchronisation using vortex oscillators is limited in frequency responses of only a few hundred MHz. It also requires dedicated current sources for the individual STOs, which can complicate the overall on-chip implementation.

To overcome the spatial and low frequency limitations, the research team came up with an array in which eight STOs are connected in series. Using this array, the 2.4 GHz electromagnetic radio waves that WiFi uses was converted into a direct voltage signal, which was then transmitted to a capacitor to light up a 1.6-volt LED. When the capacitor was charged for five seconds, it was able to light up the same LED for one minute after the wireless power was switched off.

In their study, the researchers also highlighted the importance of electrical topology for designing on-chip STO systems, and compared the series design with the parallel one. They found that the parallel configuration is more useful for wireless transmission due to better time-domain stability, spectral noise behaviour, and control over impedance mismatch. On the other hand, series connections have an advantage for energy harvesting due to the additive effect of the diode-voltage from STOs.

Commenting on the significance of their results, Dr Raghav Sharma, the first author of the paper, shared, "Aside from coming up with an STO array for wireless transmission and energy harvesting, our work also demonstrated control over the synchronising state of coupled STOs using injection locking from an external radio-frequency source. These results are important for prospective applications of synchronised STOs, such as fast-speed neuromorphic computing."

Review (lecture)

Watch the video and write its review (300-350 words).

The video: https://www.youtube.com/watch?v=_Idra8rVS1I

Grammar and vocabulary test

Grammar

Complete the paragraph using the right articles.

1) _____time-series graphs are popular with (2)_____ newspapers for suggesting and comparing (3) _____ trends. However, showing how a single quantity varies with (4)_____ time is not the same as showing how two quantities vary, and then suggesting a link between them. (5) _____ graphs showing the variation of two things with (6)_____ time often use two different vertical scales. Figure 34 shows an example taken from a national newspaper.

This graph was included in a front-page article suggesting that there is a link between (7)_____ level of unemployment among (8) _____ young men and (9)_____ number of offenders committing (10)_____ burglaries. (11) _____ way the graph has been drawn seems unambiguously to support (12) _____ claim that when (13) _____ unemployment rises so does (14)_____ crime and, by virtue of (15)_____ closeness

of (16) _____ shape of (17) _____ two curves, carries (18) _____ strong implication that indeed (19) _____ unemployment causes (20) _____ crime.

Vocabulary

Fill in the gaps using active vocabulary.

1. The process of finding a _____ is called differentiation.

2. The _____ of a line can also be interpreted as the "average rate of change."

3. Alternating the signs of the reciprocals of positive integers produces a _____ series.

4. A _____ that does not converge is divergent.

5. The _____ form the smallest group and the smallest ring containing the natural numbers.

6. The _____ is the range of the function.

7. If at each point of an interval f has a derivative that does not change sign (respectively, is of constant sign), then f is _____ on this interval.

8. A _____ is the value that a function (or sequence) approaches as the input (or index) approaches some value.

9. The curve of the _____ is a periodic curve with period $T=\pi$ and asymptotes $x=(k+1/2)\pi$, $k \in \mathbf{Z}$.

10. _____ is defined as a numerical value equal to the area under the graph of a function for some interval or a new function the derivative of which is the original function.