

Документ подписан простой электронной подписью
Информация о владельце:
ФИО: Ястребов Олег Александрович
Должность: Ректор
Дата подписания: 24.09.2024 10:29:17
Уникальный программный ключ:
ca953a0120d891083f939673078ef1a989dae18a

Federal State Autonomous Educational Institution of Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA NAMED AFTER PATRICE
LUMUMBA
RUDN University

Academy of Engineering

educational division (faculty/institute/academy) as higher education programme developer

COURSE SYLLABUS

Internal Combustion Engine test methods

course title

Recommended by the Didactic Council for the Education Field of:

13.04.03. POWER ENGINEERING

field of studies / speciality code and title

The course instruction is implemented within the professional education programme of higher education:

Mechanical Engineering

higher education programme profile/specialisation title

1. The COURSE GOAL

The discipline "Internal Combustion Engine test methods" is included in the master's degree program "Mechanical Engineering" in the direction of 13.04.03 "Energy Engineering" and is studied in the 2nd semester of the 1st year. The discipline is implemented by the Basic Department of Energy Engineering. The discipline consists of 6 sections and 6 topics and is aimed at studying the methods of testing heat engines.

The purpose of mastering the discipline is to form students' system of scientific and practical knowledge, skills and abilities in the field of measurement work during an experiment in the field of operation of internal combustion engines. As well as the formation of professional and moral qualities, the development of interest in the discipline and in the chosen specialty. Objectives of the discipline:

- to familiarize students with the basics of planning, processing and analysis of experimental results;
- to familiarize about the methods of testing engines (thermal, aerodynamic, vibration, etc.);
- to familiarize with the control and measuring equipment and sensors used;
- to familiarize with the measurement methods carried out within the framework of an experimental study.

2. REQUIREMENTS FOR LEARNING OUTCOMES:

The following competences are formed in the study process.

Table 2.1. List of competences that students acquire during the course

Competence code	Competence descriptor	Competence formation indicators
GPC-1	Ability to formulate research goals and objectives, identify priorities for solving problems, and select evaluation criteria.	GPC-1.1. Formulates the goals and objectives of the study; GPC-1.2. Defines the sequence of problem solving GPC-1.3. Formulates the criteria for making a decision.
PC-2	Ability to carry out research and development in the field of professional activity.	PC-2.1. Know the basics of using information technology; PC-2.2. Conducting research on individual tasks; PC-2.3. Have the skills to generalize and evaluate the results of scientific research.

3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The subject refers to the variable component of (B1) block of the higher educational programme curriculum.

Within the higher education programme students also master other disciplines and internships that contribute to the achievement of the expected learning outcomes as results of the subject mastery

Table 3.1. The list of the higher education programme components that contribute to the achievement of the expected learning outcomes as the course results

Competence code	Competence descriptor	Previous courses/modules, internships*	Subsequent courses/modules, internships*
GPC-1	Ability to formulate research goals and objectives, identify priorities for solving problems, and select evaluation criteria.		Alternative Energy Sources.
PC-2	Ability to carry out research and development in the field of professional activity.	-	Research Work; Research Practice.

* - in accordance with the matrix of competencies and the SUP EP VO

4. WORKLOAD OF THE COURSE AND FORMS OF STUDY WORK

General workload of the course *7 credits, 252 hours. Table 4.1.* Form of study work of EP HE

Type of academic activities		Total academic hours	Semester(s)			
			2			
<i>Contact academic hours</i>		68	68			
including:						
Lectures (LC)		34	34			
Lab works (LW)		17	17			
Seminars (workshops / tutorials) (S)		17	17			
<i>Self-studies academic hours</i>		57	57			
<i>Evaluation and assessment academic hours</i>		27	27			
<i>Course work / project, credits</i>		100	100			
Course workload	academic hours	252	252			
	credits	7	7			

5. CONTENT OF THE COURSE

Table 5.1. Content of the course

The title of the section of the discipline	Content of the section (topic)	Types of educational work*
Section 1 Introduction. Basic concepts of experiment planning. Plans for a complete factorial experiment of the first and second order.	Basic concepts of experiment planning. The tasks of the experimental study. The importance of testing in the creation of new machines, their mechanisms and assemblies, in improving existing structures. Literature. Basic terms and definitions. The main types of tests and the organization of their conduct. Classification of tests. The purpose, content and scope of the various tests. The test program. Field and laboratory tests. Tests of a scientific and research nature. Test conditions and methods.	LC, SM, AW
Section 2 Development of a measurement map.	Preliminary assessment of measurement accuracy during experimental research and selection of measuring equipment Technological testing base. The test program. The order of observation. Tests under operating conditions. Tasks and test conditions.	LC, SM, AW
Section 3 Characteristics and types of measuring equipment.	Consideration of measurement possibilities and accuracy in the application of measuring instruments in the framework of experimental research. Test benches and equipment. Measuring systems. General requirements for measuring systems and their elements, rational selection of measuring instruments.	LC, SM, AW
Section 4 Characteristics and types of measuring sensors.	Types of measuring instruments. Verification of measuring instruments. Instruments and sensors for testing. The concept of a sensor. Parametric and generator sensors. Types of sensors. Ways to turn on sensors.	LC, SM, AW
Section 5 Statistical processing of the results.	Statistical processing of the results. The main types of statistical data processing.	LC, SM, AW

Section 6 Features of thermal tests of internal combustion engines.	Features of life tests of engines, their components and assemblies. Facilities and equipment. Types and features of tests, necessary equipment.	LC, SM, AW
--	---	------------------

* - LC – lecture, LR – laboratory work, SM – seminars; AW – Autonomous work

6. INTERNSHIP EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

Table 6.1. Technical Support Requirements

A type of aclassroom	Technical Support Requirements	Special equipment, software
For lectures	An auditorium for lecture-type classes, equipped with a set of specialized furniture; board (screen) and technical means of multimedia presentations	Technical means: projector Epson EH- TW5300 (LCD, 1080p 1920 x 1080, 2200Lm, 35000:1, 2 x HDMI, MHL, экран Draper Bar-onet NTSC (3:4) 244/96(8) 152*203 MW
For seminars	Auditorium for seminar-type classes, group and individual consultations, current control and intermediate certification, equipped with a set of specialized furniture and technical means of multimedia presentations	Computer class; technical equipment: personal computers, projection screen, multimedia projector, NEC NP-V302XG, Internet access. Software: Microsoft products (OS, office suite, incl. MS Office/Office 365, Teams, Skype),
For autonomous work	Auditorium for independent work of students (can be used for seminars and consultations), equipped with a set of specialized furniture and computers with access to the EIOS	Computer class; technical equipment: personal computers, projection screen, multimedia projector, NEC NP-V302XG, Internet access. Software: Microsoft products (OS, office suite, including. MS Office/Office 365, Teams, Skype)

7. RESOURCES RECOMMENDED FOR THE COURSE:

Main literature:

1. Гусаков С.В., Патрахальцев Н.Н. Планирование, проведение и обработка данных экспериментальных исследований двигателей внутреннего сгорания. Сб. методических пособий. – М.: Изд-во РУДН, 2004. – 160 с.
2. Методические указания по тепловым испытаниям паровых турбин. docs.cntd.ru/document/1200048901
3. Методы испытаний газотурбинных установок. elar.urfu.ru/bitstream/10995/94632/1/978-5-7996
4. Байкалов, В.А. Испытания и диагностика машин: Лабораторный практикум : учебное пособие / В.А. Байкалов, В.В. Минин. - Красноярск : Сибирский федеральный университет, 2011. - 100 с. - ISBN 978-5-7638-2347-9 ; То же [Электронный ресурс]. Режим доступа <http://biblioclub.ru/index.php?page=book&id=229160>
5. Диагностика энергетических и экологических показателей ПГТ [Электронный ресурс] : Учебное пособие / Абдель Сатер Х.И. [и др.]. - Электронные текстовые данные. - М. : Изд-во РУДН, 2016. - 107 с. : ил. - ISBN 978-5-209-07254-6. Режим доступа: <http://lib.rudn.ru/MegaPro2/Web/SearchResult/ToPage/1>

Additional readings:

Дополнительная литература:

1. Сафин, Р.Г. Основы научных исследований. Организация и планирование эксперимента : учебное пособие / Р.Г. Сафин, Н.Ф. Тимербаев, А.И. Иванов ; Министерство образования и науки России, Федеральное государственное бюджетное образовательное учреждение высшего профессионального образования «Казанский национальный исследовательский технологический университет». - Казань : Издательство КНИТУ, 2013. -154 с. : ил., табл.,

схем. - Библиогр. в кн. - ISBN 978-5-7882-1412-2 Режим доступа:
<http://biblioclub.ru/index.php?page=book&id=270277>

2. c:\Program Files\PlanEx\DATA

3. Трубицын, В.А. Основы научных исследований : учебное пособие / В.А. Трубицын, А.А. Порохня, В.В. Мелешин ; Министерство образования и науки Российской Федерации, Федеральное государственное автономное образовательное учреждение высшего профессионального образования «Северо-Кавказский федеральный университет». - Ставрополь: СКФУ, 2016. - 149 с. : ил. - Библиогр. в кн. ; Режим доступа:
<http://biblioclub.ru/index.php?page=book&id=459296>

Electronic library systems:

1. Electronic libraries (EL) of RUDN University and other institutions, to which university students have access on the basis of concluded agreements:

- RUDN Electronic Library System (RUDN ELS) <http://lib.rudn.ru/MegaPro/Web>
- EL "University Library Online" <http://www.biblioclub.ru>
- EL "Yurayt" <http://www.biblio-online.ru>
- EL "Student Consultant" www.studentlibrary.ru
- EL "Lan" <http://e.lanbook.com/>
- EL "Trinity Bridge"

2. Databases and search engines:

- electronic foundation of legal and normative-technical documentation <http://docs.cntd.ru/>
- Yandex search engine [https:// www .yandex.ru/](https://www.yandex.ru/)
- Google search engine <https://www.google.ru/>
- Scopus abstract database <http://www.elsevierscience.ru/products/scopus/>

The training toolkit and guidelines for a student:

1. Collection of lectures on the course Internal Combustion Engine test methods.

* The training toolkit and guidelines for the course are placed on the internship page in the university telecommunication training and information system under the set procedure.

8. ASSESSMENT TOOLKIT AND GRADING SYSTEM* FOR EVALUATION OF STUDENTS' COMPETENCES LEVEL AS INTERNSHIP RESULTS

The assessment toolkit and the grading system* to evaluate the level of competences (competences in part) formation as the course Internal Combustion Engine test methods results are specified in the Appendix to the internship syllabus.

* The assessment toolkit and the grading system are formed on the basis of the requirements of the relevant local normative act of RUDN University (regulations / order).

DEVELOPERS:

Associate Professor in the Department
of Energy Engineering

position, educational department

Oshchepkov P.P.

name and surname

HEAD OF EDUCATIONAL DEPARTMENT:

Head of the Department of
Energy Engineering

position, educational department

Yu.A. Radin

signature

name and surname

**HEAD OF
HIGHER EDUCATION PROGRAMME:**

Head of the Department of
Energy Engineering

position, educational department

Yu.A. Radin

signature

name and surname