**Name of the course:** Electronic devices for receiving and reproducing images (EDRRI)

**Department responsible for the course or equivalent:** Department of Radio Engineering Electronics, Institute of Nanotechnologies, electronics and electronic equipment engineering

**Lecturer (name, academic title, e-mail):** Dr. of Technical Sciences Parshina Natalya, n[parshina@sefdu.ru](mailto:parshina@sefdu.ru), Dr. of Technical Sciences Smirnov Vladimir, vasmirnov@sfedu.ru.

**Semester when the course unit is delivered**: 8

**Teaching hours per week**: 3

**Level of course unit**: Bachelor level

**ECTS credits:** 5

**Admission requirements**: The course "Electronic devices for receiving and reproducing images" is based on the knowledge and skills acquired as a result of development the courses: "Higher mathematics", "Physics", "Methods of mathematical modeling", "Technical electrodynamics" "Circuit engineering", "Quantum and optical Electronics".

**Course objectives (aims)**: This course is developed for studying of physical processes, methods and means of formation, receiving and reproduction of video images. This course promotes receiving fundamental education by students, formation of scientific outlook, development of system thinking and also general cultural and professional competences. The «Electronic devices for receiving and reproducing images» course is taught in the eighth semester of bachelor's program.

**Course contents**:

The course is comprised of 5 units (and a UNIT 0) and 4 laboratory works. Each unit ends with students performing an individual task (project) under the guidance of a lecturer.

**Unit 0:** Principles of reception of video images.

Students study the basic characteristics of the image, the general principles of work and the history of the development of devices for receiving video images

**Unit 1:** Formation of electron flows.

Students study in detail the trajectories of electrons in axisymmetric fields, electronic and magnetic lenses, deflection system.

**Unit 2:** Electron-beam devices for converting video images.

Students consider the process of photoelectric emission, photocathodes, vacuum photocells, electron-optical converters.

**Unit 3:** Devices for the reproduction of video images.

Students get acquainted with the basic characteristics of image sensors, the characteristics of visual perception. Consider the classification and general information about electron-beam devices.

**Unit 4:** Solid-state image converters.

Students study charge-coupled devices and video cameras.

**Unit 5:** Means of information display.

Students study:

- Information models, parameters and characteristics of information display devices

- Liquid crystal indicators

- Color LCD monitors

- Plasma panels

- Devices for reproducing on discrete indicators

- Control of discrete indicators

- Touch screens

**Unit 6.** Systems for recording and storing video information.

Students study:

  - magnetic video recording

  - digital video recorders

- DVD - optical digital disk medium

- Flash Cards

- Ergonomic characteristics of the video image

**Laboratory works:**

1. Investigation of an oscillograph tube.

2. Investigation of vacuum fluorescent indicators.

3. Investigation of gas-discharge indicators.

4. Research of the characteristics of visual perception.

**Learning outcomes**: Students present the individual task (project) written in English on the current topic: Electronic devices for reception and reproduction of images, and also give an oral presentation.

**Planned learning activities and teaching methods:** lectures with a variety of examples and practice.

**Assessment methods and criteria** (Методы оценки и критерии)

Assignments for this course consists of: 6 individual tasks (project) and the presentation, reports on the performed laboratory works, exam.

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| 1.Principles of reception of video images **Project**: | one week from end of unit 5% |
| 2.Formation of electron flows **Project**: | one week from end of unit 5% |
| 3.Electron-beam devices for converting video images **Project:** | one week from end of unit 5% |
| 4. Devices for the reproduction of video images **Project:** | one week from end of unit 5% |
| 5. Solid-state image converters **Project:** | one week from end of unit 10% |
| 6. Means of information display **Project:** | one week from end of unit 10% |
| 7. Systems for recording and storing video information **Project:** | one week from end of unit 10% |
| 8. Presentation in class | 10 min pres. and 5 min Q&A 10% |
| 9. **Report on the performed laboratory work:** Investigation of an oscillograph tube | one week from end of unit 5% |
| 10. **Report on the performed laboratory work:** Investigation of vacuum fluorescent indicators. | one week from end of unit 5% |
| 11. **Report on the performed laboratory work:** Investigation of gas-discharge indicators. | one week from end of unit 5% |
| 12. **Report on the performed laboratory work:** Research of the characteristics of visual perception. | one week from end of unit 5% |
| 13. Final exam | Content and grammar 20% |

A 10% per day late penalty will be applied to all assignments. 100%

**Course literature (recommended or required):**

1. Electronic devices, S.G. Prokhorov, O.V. Shindor – Rostov - on - Don: Phoenix, 2012. – 333 pages.

2. Devices of reception and reproduction of the image: Manuals/ Chervyakov G.G. – Taganrog: Publishing house of Southern Federal University, 2016. – 251 pages.

3. Means of display of information: Manual/Demeshko E.V., Lisenkov A.A., Stepanov V. A. – Saint Petersburg.: Saint-Petersburg state electrotechnical university «LETI»., 2003.

4. Stepanov R.M., Tsyrlin L.E., Shitikov E.I. The transferring television devices: Studies. Grant. P.1 – SPb.: Central Research Institute Elektron, 2015.

5. Chervyakov G. G., Osadchiy E.N. Elements and devices of semiconductor electronics. - Taganrog: Publishing house of Institute of technology of SFU, 2014. – 282 pages.