Faculty: FACULTY OF TELECOMMUNICATIONS AND MANAGEMENT
Department: GENERAL ENGINEERING
Professional Field: 5.13. GENERAL ENGINEERING
Specialty: DIGITAL PUBLIC ADMINISTRATION
Educational-qualification degree: BACHELOR

LEARNING COURSE DESCRIPTION

1. Course title: *5 G AND SMART TECHNOLOGY*
2. Course code: B.48.053.1
3. Type of the course: *Compulsory*
4. Level: *Bachelor*
5. Year of study: *Third*
6. Semester: *Sixth*
7. Number of credits: *3*
8. Name of the lecturer: *Assoc. Prof. Eng. Grigor Mihaylov, PhD*
9. Course learning outcomes:

The aim of the course is to introduce students to the main characteristics of mobile cellular networks, their evolution and the services they provide.

Students who have completed their training in the discipline must acquire:

Competencies: After successful completion of the course, students should be able to:

- *know*: the basic concepts and facts of modern mobile cellular networks; the architectures of the radio interface; multi-antenna signal dissemination techniques; Machine-to-Machine communications in unlicensed spectra.
- *can*: explain the concepts in the field of modern mobile cellular networks; be aware of the main features of fifth generation mobile networks; explain the possibilities and technological features of communication between consumer devices.

10. Teaching Methods:

The *teaching method* is in classical and discussion form, according to the specifics of the subject, as well as practical exercises. The ongoing control is performed in the form of tests and practical tasks.

11. Prerequisites:

Students should have a thorough knowledge of the Information technologies in public administration, Network technologies, Cloud computing.

Courses of this discipline are Information systems in public administration, Cybersecurity of digital public administration, Information security management systems.

12. Course contents:

The discipline addresses topics related to mobile cellular networks and their evolution; principle of operation of the fourth generation of mobile networks; technological features of fifth generation mobile networks; architecture of the radio interface of 5G networks; device-to-device and vehicle-to- vehicle communications.

13. Bibliography

Basic literature:

1. **Т. Илиев, Гр. Михайлов,** Системи и мрежи за широколентов радио достъп. Анализ на ефективността на разпределение на ресурсите, ИК Медиатех, 2018.
2. **Гр. Михайлов,** Методи за кодиране в мобилни мрежи от четвърто поколение, Дисертационен труд, 2015.
3. **A. Osseiran, J. F. Monserrat, P. Marsch,** 5G Mobile and Wireless Communications Technology, Cambridge University Press, 2016.
4. **E. Dahlman, S. Parkvall, J. Skold,** 5G NR: The Next Generation Wireless Access Technology, Elsevier Science, 2018.
5. **A. Zaidi, F. Athley, J. Medbo, U. Gustavsson, G. Durisi, X. Chen,** 5G Physical Layer: Principles, Models and Technology Components, Elsevier Science, 2018.

Additional literature:

1. **J. Rodriguez,** Fundamentals of 5G Mobile Networks, Wiley, 2015.
2. **E. Dahlman, S. Parkvall, J. Skold,** 4G, LTE-Advanced Pro and The Road to 5G, Elsevier Science, 2016.
3. **Л. Добош, Я. Духа, С. Мархевски, В. Визер,** Мобилни радиомрежи, КТП, София, 2004.
4. **A. Alexiou,** 5G Wireless Technologies, Institution of Engineering & Technology, 2017.

5. **H. Holama, A. Toskava,** HSDPA/HSUPA for UMTS High Speed Radio Access for Mobile Communications, John Wiley & Sons Inc., 2006.

14. Assessment methods and criteria:

The course ends with an *ongoing assessment*. Individual Student's and their collective team work is taken into account during the semester - ongoing control during lectures and seminars.

1.Requirements for the assessment of the six-point system

The grade in the course is formed on the basis of a points system as the maximum number of points that students can receive is 60. They are formed by the grades from ongoing control and the work of students during the exercises.

2. Formation of the final mark

The formation of the final grade is based on the points obtained during the semester, and the correspondence between the number of points and the grade according to the six-point system is presented in Table 1.

Table 1.

Number of points	**Assessment According to the 6-point Scale System**
0 – 29	Fail **2 (**F)
30 – 34	Satisfactory **3** (D)
35 – 44	Good **4** (C)
45 – 54	Very good **5** (B)
55 – 60	Excellent **6** (A)

15. Language of instruction: Bulgarian