# DESCRIPTION OF THE COURSE

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| Name of the course:<br>**Mathematics III** | Code: **MAT31** | Semester: **3** |
| Type of teaching:<br>Lectures (L)<br>Seminars (S) | Hours per semester:<br>L – 15 hours<br>S – 15 hours | Number of credits: **6** |

**LECTURER(S)**:
Assoc. Prof. Albena Pavlova, PhD (FME), tel.: 032 659 652, e-mail: albena_pavlova@tu-plovdiv.bg
Assist. Radoslava Terzieva, PhD (FME), tel.: 032 659 651, e-mail: radoslavaterzieva@tu-plovdiv.bg
Assist. Prof. Radka Koleva, PhD (FME), tel.: 032 659 651, e-mail: rkoleva@tu-plovdiv.bg
Technical University of Sofia

**COURSE STATUS IN THE CURRICULUM**: Compulsory subject from the curricula for training of students to obtain Bachelor's degree, specialties Mechanical and Instrument Engineering, Mechanical Engineering and Technologies, Mechatronics, Autotransport machinery, Professional orientation 5.1 Mechanical engineering, Field 5 Technical Sciences.

**AIMS AND OBJECTIVES OF THE COURSE:** Familiarization the students with basic parts of the mathematical analysis and neighbour mathematical disciplines necessary for application disciplines.

**DESCRIPTION OF THE COURSE:** Main topics: Series, function series and Fourier series. Some notions and basic theorems from the field theory – stream, divergence, circulation, rotation of the vector field, Theorems of Green, Gauss and Stokes. Theorem for the independence of the integral from the path; Function of one complex variable – limit of function, continuity, derivative of function of one complex variable, analytic function. Cauchy-Riemann conditions (equations), conformal mapping. Integration in the complex domain – linear integral, Cauchy integral theorem, Cauchy integral formula and formula for derivatives. Power series expansion of general analytic function (Taylor series). Classification of the isolated singularities and definition of Laurent series and residues. Theorem for the residues. Application of residues to evaluation of real integrals; Foundations of the operational calculus – Laplace transform – basic properties and theorems. Applications – solving some classes differential and integral equations.

**PREREQUISITES:** Very good training in Mathematics I (MAT12) and Mathematics II (MAT22).

**TEACHING METHODS**: Lectures and Seminars.

**METHOD OF ASSESSMENT:** Written examination.

**INSTRUCTION LANGUAGE:** Bulgarian

**BIBLIOGRAPHY:**
1. Колектив на ИПМИ, Висша математика, части III и IV, Техника, 1986, 2. Колектив на ИПМИ, Избрани глави от математиката, Модули I – V, ТУ–София, 1993, 3. Колектив на ИПМИ, Сборник от задачи по висша математика, IV част, 1979, 4. Маринов М.С. Аналитични функции. Редове на Фурие. Интегрални трансформа-ции, 5. ТУ–София, 1996.

**DESCRIPTION OF THE COURSE**

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|---|---|---|
| Name of the course:<br>**Mechanics II** | Code: **MEC02** | Semester: **3** |
| Type of teaching:<br>Lectures (L)<br>Laboratory Work (LW) | Hours per semester:<br>L – 15 hours<br>LW- 15 hours | Number of credits:**7** |

**LECTURER(S)**:

Assoc. Prof. Raycho Raychev, PhD (FME), tel.: 0895581138,
e-mail: rpraichev@tu-plovdiv.bg
Chief Assist. Prof. Eng. Chavdar Pashinski, PhD (FME), tel.: 0878302513,
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Technical University of Sofia

**COURSE STATUS IN THE CURRICULUM**: Compulsory subject from the curricula for training students for Bachelor's degree, specialties Mechanical and Instrument Engineering, Mechanical Engineering and Technologies, Mechatronics, Autotransport machinery, Professional orientation 5.1 Mechanical engineering, Field 5 Technical Sciences.

**AIMS AND OBJECTIVES OF THE COURSE:** The course builds engineering and technical culture in students and develops knowledge and skills for independent work and engineering assessment of various types of technical problems. The exercises expand the practical knowledge and skills in the studied discipline.

**DESCRIPTION OF THE COURSE:** Main topics: Basic concepts and laws in dynamics. Dynamics of free and non-free particle - differential equations of motion. Straight and inverse task; Mechanical vibrations - free undamped and damped vibrations. Vibrations in environments with and without resistance. Dynamics of the relative motion of particle; Dynamics of mechanical systems - differential equations of motion. Geometry of masses; General theorems of dynamics; Dynamics of an ideal rigid body - translational, rotational and planar motion.

**PREREQUISITES:** Mathematics, Physics.

**TEACHING METHODS**: Lectures, using slides. Laboratory exercises are performed in a computer class using specialized software.

**METHOD OF ASSESSMENT:** Written exam at the end of the semester.

**BIBLIOGRAPHY:** 1. S. Bachvarov, Mechanics Part II, Sofia, 2011; A. Pisarev, Ts. Paraskov, S. Bachvarov, Course in Theoretical Mechanics Part II, Technique, 1975; I. Ivanov, „Technical Mechanics“, Hristo G. Danov, 1974.

# DESCRIPTION OF THE COURSE

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|---|---|---|
| Name of the course:<br>**Strength of materials** | Code: **MEC03** | Semester: **3** |
| Type of teaching:<br>Lectures (L)<br>Laboratory work (LW)<br>Course work (CW) | Hours per semester:<br>L – 25 hours<br>LW – 15 hours | Number of credits: **7** |

**LECTURER(S)**:
Assoc. Prof. Eng. Pepo Yordanov, PhD (FME), tel.: 659 514, e-mail: piyordanov@tu-plovdiv.bg
Assoc. Prof. Eng. Raycho Raychev, PhD (FME), tel.: 659 623, e-mail: rpraichev@tu-plovdiv.bg
Assist. Eng. Ivanka Delova, (FME), tel.: 659 623, e-mail: ivankadelova@tu-plovdiv.bg
Technical University of Sofia

**COURSE STATUS IN THE CURRICULUM**: Compulsory subject from the curriculum for teaching students for educational qualification degree "Bachelor", in specialties Mechanical and Instrument Engineering, Mechanical Engineering and Technologies, Mechatronics, Autotransport machinery, Professional field 5.1 Mechanical Engineering, Field 5 Technical Sciences.

**AIMS AND OBJECTIVES OF THE COURSE:** The students must acquire knowledge in stress-strain analysis of parts and structures which is needed for studying of special subjects as well as learn practical methods for strength design of beams and bars.

**DESCRIPTION OF THE COURSE:** The main topics concern: Main principles and hypothesis; Geometrical characteristics of plane figures; Internal forces in straight beams, and planar frames; Design in case of: pure tension (compression), pure bending, unsymmetrical bending, combination of bending and tension (compression), bending and shearing (transverse loading), pure torsion, bending and torsion; State of stress at a point; Hooke's law; Conditions for strength in case of complex stress; Buckling of compressed bars; Materials fatigue; Introduction to computer methods in engineering.

**PREREQUISITES:** Mathematics, Physics, Material science, Mechanics.

**TEACHING METHODS**: Lections and laboratory work according to the classical method and/or multimedia presentations.

**METHOD OF ASSESSMENT:** During the semester, the defense of correctly solved tasks from the course work is evaluated. Exam consisting of two problems and two theoretical questions.

**INSTRUCTION LANGUAGE:** Bulgarian

**BIBLIOGRAPHY:**
1. Н. Николов, Съпротивление на материалите, Авангард Прима, София, 2017 ISBN 978-619-160-831-7. 2. Р. Стефанов, П. Йорданов, Зл. Златанов, Съпротивление на материалите – ръководство за решаване на задачи, Пловдив, 2007, ISBN – 978-954-8779-93-7. 3. П. Йорданов, Р. Стефанов, М. Ташев, Съпротивление на материалите – задачи за самостоятелна подготовка, Пловдив, 2007, ISBN – 978-954-8779-95-1, 4. Р. Стефанов, П. Йорданов, Курсови задачи по съпротивление на материалите, ТУ - София, филиал Пловдив, 2002, ISBN 954-8779-32-3. 5. Милчо Д. Ташев, Пепо Ив. Йорданов, Инженерен анализ с метода на крайните елементи, Екс-Прес, Габрово, 2012, ISBN – 978-954-490-350-3

# DESCRIPTION OF THE COURSE

| | | |
|---|---|---|
| Name of the course:<br>**Engineering Graphics** | Code: **ENG02** | Semester: 3 |
| Type of teaching:<br>Lectures (L)<br>Laboratory work (LW) | Hours per semester:<br>L – 15 hours<br>LW – 25 hours | Number of credits: **6** |

**LECTURER(S)**:
Assist. Prof. Eng. Adelina Vasileva, PhD (FME), tel.: 659 590, e-mail: adelina.bogoeva@ tu-plovdiv.bg
Assist. Eng. Nikolai Paitakov (FME), tel.: 659 590, e-mail:
Technical University of Sofia

**COURSE STATUS IN THE CURRICULUM**: Compulsory subject from the curricula for training of students to obtain Bachelor's degree, specialties Mechanical and Instrument Engineering, Mechanical Engineering and Technologies, Mechatronics, Autotransport machinery, Professional orientation 5.1 Mechanical engineering, Field 5 Technical Sciences.

**AIMS AND OBJECTIVES OF THE COURSE:** The Engineering Graphics course aims to develop students' spatial thinking and technical culture. It provides the necessary minimum of knowledge for building and reading the images of machine-building products in the technical drawings. The student acquires knowledge and skills in mechanical engineering, making his own design drawings and text documents of the products in compliance with all important requirements of the standards in this field, necessary for the next design disciplines in engineering training.

**DESCRIPTION OF THE COURSE:** Main topics: Basic positions of the graphical representation of geometric objects on a plane. Types of design. Monge design. Mutual position of geometric objects. Transformation of projections. Depiction of lines, surfaces and bodies. Plain sections. Intersection of surfaces and bodies. Axonometric design. Standardization of graphic information. Technical drawings. Design documents of the details. Accuracy of dimensions and surfaces of details. The theory and practice of Engineering Graphics are considered together with a course on Tolerances and Assemblies. The methods for depiction of details and assembled units and for execution of their design and text documents in compliance with over 150 standards of ESKD are covered. The principles and methods of geometric and functional sizing of the products are considered, incl. with the application of the main types of tolerances and joints. Students will acquire skills for developing a set of working design documentation, as well as for the implementation of the basic documents of a set of design documentation. More in-depth skills are created for the application of the current CAD systems in the automated execution of a detailed and assembled drawing of a set of documentation.

**PREREQUISITES** Knowledge and methods are used in the discipline "Mathematics" on the basis of which methods are developed for solving problems in the field of applied geometry and engineering graphics.

**TEACHING METHODS**: Lectures, assisted by drawings, slides, boards. Laboratory exercises. Course work in which specific problems in the field of applied geometry are solved.

**METHOD OF ASSESSMENT:** Current assessment, point system of control works, course work.

**INSTRUCTION LANGUAGE:** Bulgarian

**BIBLIOGRAPHY:**
1.Сандалски Б., П. Горанов, Г. Динев, И. Николова Основи на конструирането и CAD, София, СОФТТРЕЙД, 2008; 2. Туджаров Б., Е. Тодорова, Д. Колева, М. Янчева “Ръководство за упражнения и курсова работа по Основи на конструирането и CAD I, София, СОФТТРЕЙД, 2008; 3. Инженерна графика А. Стоев, Е. Златанова, П. Горанов 2004; 4. Тихомир Гр. Василев „Справочник по технически чертежи“, Steno ISBN: 978-954-449-

**DESCRIPTION OF THE COURSE**

| | | |
|---|---|---|
| Name of the course:<br>**Internet technologies** | Code: **CCE24** | Semester: **3** |
| Type of teaching:<br>Lectures (L)<br>Laboratory work (LW)/Seminars (S) | Hours per semester:<br>L – 10 hours<br>S – 10 hours<br>LW – 0 hours | Number of credits: **3** |

**LECTURER(S)**:
Assoc. Prof. Maria Marinova, PhD (FEA), tel.: 032 659 728, e-mail: m_marinova@tu-plovdiv.bg;
Assis. Prof. Veselka Dimitrova, PhD (FEA), tel.: 659 754, e-mail: vpetrova@tu-plovdiv.bg
Technical University of Sofia

**COURSE STATUS IN THE CURRICULUM**: Compulsory subject from the curricula for training of students to obtain Bachelor's degree, specialties in specialties Mechanical and Instrument Engineering, Mechanical Engineering and Technologies, Mechatronics, Autotransport machinery, Professional field 5.1 Mechanical Engineering, Field 5 Technical Sciences.

**AIMS AND OBJECTIVES OF THE COURSE:** The aim of the course is for students to get acquainted with and use Internet technologies. Understand the network structure of the Internet, the ISO model, the basic protocols used such as HTTP, TCP / IP, Internet addresses and the name system; applications for cooperation and exchange of information, Internet services, means of protection.

**DESCRIPTION OF THE COURSE:** The main topics concern: Internet Basics – Internet Network structure; network standards, ISO Model, HTTP, TCP/IP, Internet Addressing, Internet Domain Name Server, WWW, Client and Servers; Electronic Mail Basics; World Wide Web and Website Development – Web pages, Web Browsers, Web Servers, Search Engines, Proxy Servers, Website Designing, Website Publishing, Website Hosting, Website Security; Internet collaboration – Mailing List, Social Networking, Web Conferencing, Webinars, Online Education; Internet Security – Firewall Security, Data Encryption; Internet Web Programming – HTML, CSS, Java Script, PHP, ASP etc.

**PREREQUISITES:** Information and Communication Technologies.

**TEACHING METHODS**: Lectures, using slides, case studies, laboratory, work in teams, protocols.

**METHOD OF ASSESSMENT:** Two one-hour assessments at mid and end of semester (72%), laboratories (28%).

**INSTRUCTION LANGUAGE:** Bulgarian

**BIBLIOGRAPHY:** 1. Кирил Боянов, Компютърни мрежи. Интернет, „Котларски - Диков“, София, 1998, ISBN 954-9713-01-7; 2. Любен Боянов, Кирил Боянов, Христо Турлаков и др. Компютърни мрежи и телекомуникации; Авангард Прима; 2014, ISBN: 9786191602575; 3. Internet technologies overview

http://user.engineering.uiowa.edu/~ie181/Documents/Section1-Text.pdf; 4. Learn Internet Technologies https://www.tutorialspoint.com/internet_technologies/index.htm.

# DESCRIPTION OF THE COURSE

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|---|---|---|
| Name of the course:<br>**Sport** | Code: **FaSPR03** | Semester: **3** |
| Type of teaching:<br>Lectures (L)<br>Laboratory work (LW)/Tutorials (T)<br>Course work (CW)<br>Self-Study (SS) | Hours per semester:<br>L – 0 hours<br>T – 0 hours<br>LW – 0 hours<br>SS – 30 hours | Number of credits: **1** |
| Course project (CP) | Code: - | Number of credits: **0** |

**LECTURER(S)**:

Sen. Lect. Daniel Vladimdirov, PhD (FEA), Tel.: 032 659 646, E-mail: danielv@tu-plovdiv.bg,

Sen. Lect. Petar Doganov, PhD (FEA), E-mail: pdoganov@tu-plovdiv.bg,

Sen. Lect. Boris Spasov, PhD (FEA), E-mail: boris_spassov@tu-plovdiv.bg

Technical University of Sofia

**COURSE STATUS IN THE CURRICULUM**: Facultative subject from the curriculum / curricula for training of students to obtain Bachelor's degree, specialty „Mechanical and Instrument Engineering“, „Mechatronics“, „Mechanical engineering and technologies“, „Autotransport machinery“, Professional orientation 5.1 Mechanical engineering, Professional field 5 Technical Sciences.

**AIMS AND OBJECTIVES OF THE COURSE:** Targeted at further developing of students' physical activities, skills and hygiene habits through effective methods of physical education, improving their mental and physical performance.

**DESCRIPTION OF THE COURSE:** The knowledge and skills in Physical Education and Sports develop a wide range of motor skills and habits, help the hardening of the body and contribute to the moral development of students. The enhancement of physical skills is carried out through: 1. General Physical Preparedness – in these seminars the students develop a wide range of motor skill and habits; work to improve strength, speed, endurance, flexibility, structure and skill; increase resistance to unfavourable environmental factors; develop their physical qualities and experience. 2. Sports-Specific Physical Preparedness – students improve their sport skills and habits in a specific sport and gain experience through participation in competitions; work to improve strength, speed, endurance, flexibility, structure and skill; increase resistance to unfavourable environmental factors; develop their physical qualities and experience.

**PREREQUISITES:** The curriculum presumes the minimum of knowledge and skills acquired at secondary school.

**TEACHING METHODS**: Seminars in accordance with the curriculum in PE and Sport.

**METHOD OF ASSESSMENT:** Evaluation is based on functional tests at the end of semester. Lecturer's signature is required at the end of semester and "Pass grade.

**INSTRUCTION LANGUAGE:** Bulgarian

**BIBLIOGRAPHY:**
1. Владимиров В. Туризъм и ориентиране. Методическо ръководство за студентите от ТУ София, филиал Пловдив. Издателство на ТУ - София. 2010.

**DESCRIPTION OF THE COURSE**

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| Name of the course:<br>**Machine elements** | Code: **MEC04** | Semester: **4** |
| Type of teaching:<br>Lectures (L)<br>Laboratory work (LW)<br>Seminary work (SW) | Hours per semester:<br>L – 25 hours<br>LW – 15 hours<br>SW – 10 hours | Number of credits: **7** |
| Course project (CP) | Code: **MEC07** | Number of credits: **3** |

**LECTURER(S)**:
Assoc. Prof. Krasimir Ambarev, PhD (FEA), tel.:032 659575, e-mail: kambarev@tu-plovdiv.bg
Assis. Prof. Valeri Bakardzhiev, PhD (FME), tel.: 659 519, e-mail:bakardzhiev@tu-plovdiv.bg
Technical University of Sofia

**COURSE STATUS IN THE CURRICULUM**: Compulsory subject from the curricula for training of students to obtain Bachelor's degree, specialties Mechanical and Instrument Engineering, Mechanical Engineering and Technologies, Mechatronics, Autotransport machinery, Professional orientation 5.1 Mechanical engineering, Field 5 Technical Sciences.

**AIMS AND OBJECTIVES OF THE COURSE:** The course Machine Elements has a constructive focus and aims to acquaint students with the elemental basis of modern machines, as well as to form knowledge and skills for functional and robust calculation, selection and construction of machine elements.

**DESCRIPTION OF THE COURSE:** During the lectures, seminars and laboratory exercises the general purpose machine elements are studied, such as detachable and non-detachable joints, elastic elements, axles and shafts, sliding and rolling bearings, clutches, mechanical gears. The basic principles of the construction of machine-building products are presented, based on criteria for operability, load-carrying capacity, durability and economy.

**PREREQUISITES** : Acquired knowledge from the disciplines Engineering Graphics, Mechanics, Strength of Materials, Materials Science.

**TEACHING METHODS**: Lectures delivered with the help of a multimedia projector and visual materials. Seminars and laboratory exercises for consolidation of theoretical knowledge by example calculation of specific machine elements and experimental determination of their functional characteristics.

**METHOD OF ASSESSMENT:** Written exam (in the form of a test) for all who successfully defended the protocols from the laboratory exercises. Course project with assessment.

**INSTRUCTION LANGUAGE:** Bulgarian

BIBLIOGRAPHY: 1. Димчев Г., Захариев К.: Машинни елементи, ч.1,2,3. София, Софтрейд 2004 г.; 2. Лефтеров . Л., И. Димитров, П.Йорданов. Машинни елементи. София, Техника, 1994г.; 3. Николов Н. и др.: Ръководство за конструктивни упражнения по машинни елементи. София, Техника 1992 г. 4. Арнаудов К.Б., И.П.Димитров, П.В.Йорданов, Л.С.Лефтеров, "Машинни елементи". С. Техника, 1980 г. 5. Mott, R. L., Vavrek, E. M., Wang, J., 2018, Machine elements in mechanical design - Sixth Edition, Pearson Education, Inc., ISBN 10: 0-13-444118-4, NY. 6. Budynas, R. G., Keith Nisbett, J., 2015, Shigley's Mechanical Engineering Design - Tenth Edition, McGraw-Hill Education, New York, ISBN 978-0-07-339820-4. 7. Курс: Машинни елементи (tu-plovdiv.bg). 8. Курс: Машинни елементи I-ра част (tu-plovdiv.bg) 9. Курс: Машинни елементи II-ра част (tu-plovdiv.bg)

**DESCRIPTION OF THE COURSE**

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| Name of the course:<br>**Fluid Mechanics, hydro and pneumatic drive** | Code: **MEC05** | Semester: **4** |
| Type of teaching:<br>Lectures (L)<br>Laboratory work (LW) | Hours per semester:<br>L – 25 hours<br>LW – 15 hours | Number of credits: **6** |

**LECTURER**:
Assoc. Prof. Atanas Nachev, PhD (FME), tel.: 032 659 514, e-mail: anachev@tu-plovdiv.bg
Assist. Prof. Emil Toshkov PhD, tel.:-, e-mail: emtoshkov@tu-plovdiv.bg
Assist. Prof. George Djurkov (FME), tel.: 032 659 622, e-mail: george.djurkov@tu-plovdiv.bg
Technical University of Sofia

**COURSE STATUS IN THE CURRICULUM**: Compulsory subject from the curriculum of students to obtain Bachelor's degree in specialties Mechanical and Instrument Engineering, Mechanical Engineering and Technologies, Autotransport machinery, Professional orientation 5.1. Mechanical engineering, Field 5 Technical Sciences.

**AIMS AND OBJECTIVES OF THE COURSE:** The program is organized so that to build both theoretical background and practical skills necessary for understanding and further studies in the field of applied fluid dynamics and theoretical predictions. Special attention is paid to recent achievements in flow measurements and computational fluid dynamics. The program is correlated with the other subjects (inputs and outputs) related to Fluid Mechanics.

**DESCRIPTION OF THE COURSE:** The main topics concern: Basic characteristics of fluids - continuity, density - compressibility, viscosity; Fluid statics - equilibrium of compressible an incompressible fluids, pressure measurements, fluids under acceleration, floating – Archimed`s law; Kinematics - Lagrangian and Eulerian approach, streamlines and flow patterns, fluid particle acceleration, movement decomposition; Basic laws - mass conservation – continuity equation and flow rate; conservation of linear momentum - forces and tensor of shear stresses, momentum equation and the moment of momentum equation; energy conservation - the energy equation, Fluid models – Newton`s law for viscosity, inviscid fluids; equations of viscous fluid motion – the Navier-Stokes equations; inviscid fluid equations of motion – Euler`s equations; Application of Euler`s equations - the Bernoulli equation; Inviscid flow dynamics - Euler's equation of motion; the Bernoulli equation; stagnation parameters, velocity measurements, flow rates, outflow, cavitation, critical parameters for compressible fluid, simple and Laval`s nozzle; Momentum equation for stationary flows – application: a jet striking a flat plate, a flow round a pipe-bend; Dimensional analysis – dimensional and dimensionless quantities; Π-theorem; physical similarity – types; dynamic similarity numbers; similarity criteria – examples; types of flows according to Reynolds number: laminar and turbulent flows; Laminar flow between walls: in pipe with circular cross section, between parallel planes; applications: viscosity measurements – viscosimeters. Main characteristics of flows with great Reynolds numbers – irrotational basic floe and boundary layer; Laminar boundary layer – Prandtl`s theory; separation of the boundary layer; flow over flat plane – Blasius flow; Turbulent flow – mechanism; Reynold`s shear stresses; Reynolds equations; hypothesis; turbulent boundary layer; flow over immersed bodies – drags; turbulent flows in pipes – friction and minor losses; total head and pressure losses.

**PREREQUISITES:** Physics, Mechanics, Mathematics, Information and communication technologies.

**TEACHING METHODS**: Lectures, using slides, case materials and examples from Internet, laboratory works, work in teams, protocols - preparation and defense.

**METHOD OF ASSESSMENT:** Two one-hour assessments at mid and end of semester (20%), laboratories (30%), exam (50%).

**INSTRUCTION LANGUAGE:** Bulgarian

**BIBLIOGRAPHY:**

1. S. Tabakova, S. Radev, Fluid Mechanics, Sofia, TU-Sofia, 2011.(in Bulgarian)
2. B.S.Massey, Mechanics of Fluids, 8-th edition, 2006, Chapman & Hall, London.
3. V. Lyubenov et al., Fluid Mechanics, Sofia, TU-Sofia, 1998. (in Bulgarian)
4. П.Станков и др., Fluid Mechanics, Collection of 10 scrolls, Sofia, TU-Sofia, 1991. (in Bulgarian)
5. J.F.Douglas and R.D. Matthews, Solving Problems in Fluid mechanics, Vol. 2, 1996, Longman Sci. &Tech., England
6. White F. M., Fluid Mechanics, 7-th edition 2010, McGraw Hill Book Company, e-book: www.mhhe.com/engcs/mech/white
7. Multimedia Fluid Mechanics DVD-ROM, 2nd Edition 2008, Edited by G. M. Homsy , University of California, Santa Barbara

# DESCRIPTION OF THE COURSE

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| Name of the course:<br>**Thermodynamics and Heat Transfer** | Code: **ENR01** | Semester: **4** |
| Type of teaching:<br>Lectures (L)<br>Laboratory work (LW)/Seminars (S)<br>Course work (CW) | Hours per semester:<br>L – 15 hours<br>S – 0 hours<br>LW – 15 hours | Number of credits: **5** |

**LECTURERS**:
Prof. Eng. Valyo Nikolov, PhD (FME), tel.: 032 659 594, e-mail: vnikolov@tu-plovdiv.bg
Assist. Prof. Emil Toshkov PhD, tel.:-, e-mail: emtoshkov@tu-plovdiv.bg
Assist. Prof. George Djurkov (FME), tel.: 032 659 622, e-mail: george.djurkov@tu-plovdiv.bg
Technical University of Sofia

**COURSE STATUS IN THE CURRICULUM**: Compulsory subject from the curriculum of students to obtain Bachelor's degree in specialties Mechanical and Instrument Engineering, Mechanical Engineering and Technologies, Autotransport machinery, Professional orientation 5.1. Mechanical engineering, Field 5 Technical Sciences.

**AIMS AND OBJECTIVES OF THE COURSE:** After completing the course, the students must know the basic concepts, equations and dependencies in thermodynamics, as well as be able to apply the basic principles in their study and in their practical use. In addition, students must know the physical basis of heat distribution through thermal conductivity, convection and radiation in their joint action, as well as apply engineering methods for calculating different types of heat transfer.

**DESCRIPTION OF THE COURSE:** Main topics:
1. Thermodynamic parameters of the state; Basic laws of ideal gases; Basic thermodynamic processes; First and Second Laws of Thermodynamics; Real gases, steam processes; Theoretical cycles of internal combustion engines.
2. Thermal conductivity; Convective heat transfer; Similarity theory; Radiant heat transfer; Heat transfer.
3. Basics of solar thermal energy; Shallow geothermal energy; Energy from the oceans.

**PREREQUISITES:** Knowledge of Mathematics, Physics and Fluid mechanics is required.

**TEACHING METHODS**: Lectures using slides and demo programs, laboratory exercises with protocols.

**METHOD OF ASSESSMENT:** Written exam.

**INSTRUCTION LANGUAGE:** Bulgarian

**BIBLIOGRAPHY:**
1. В. Йорданов, Д. Палов, А. Георгиев. Топлотехника (термодинамика, топлопренасяне, възобновяеми източници на енергия) - учебник, Издателство на ТУ-София, 2012, ISBN 978-954-438-967-3, 240 стр.
2. A. Georgiev. Thermodynamics and heat transfer (Manual for laboratory exercises), Imeon Publishing House, Plovdiv, ISBN 978-954-9449-53-2, 2012, 50 pages.
3. А. Георгиев. Термодинамика и топлопренасяне - ръководство за лабораторни упражнения, Издателство Имеон, Пловдив, ISBN 978-954-9449-55-6, 2012, 100 стр.
4. A. Georgiev. Thermodynamics and heat transfer (Textbook), Imeon Publishing House, Plovdiv, ISBN 978-954-9449-67-9, 2013, 200 pages.

# DESCRIPTION OF THE COURSE

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|---|---|---|
| Name of the course:<br>**Theory of mechanisms and machines** | Code: **MEC06** | Semester: **4** |
| Type of teaching:<br>Lectures (L)<br>Laboratory work (LW)<br>Seminary work (SW) | Hours per semester:<br>L – 15 hours<br>SW – 10 hours<br>LW – 10 hours | Number of credits: **6** |

**LECTURER(S)**:
Assoc. Prof. Angel Poparov, PhD (FME), tel: (032) 659 617 poparan@abv.bg
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Technical University of Sofia

**COURSE STATUS IN THE CURRICULUM**: Compulsory subject from the curriculum of students to obtain Bachelor's degree in specialties Mechanical and Instrument Engineering, Mechanical Engineering and Technologies, Autotransport machinery, Professional orientation 5.1. Mechanical engineering, Field 5 Technical Sciences.

**AIMS AND OBJECTIVES OF THE COURSE:** Its main goal is to make the transition from general scientific to constructive and technological knowledge, giving students the necessary knowledge about the nature of mechanical systems and their construction. The course increases the engineering and technical culture of students and helps to develop creative and inventive thinking in the design and improvement of various technical means.

**DESCRIPTION OF THE COURSE:** The topics of the course cover the issues of structural, geometric, kinematic, kinetostatic and dynamic analysis and synthesis of mechanisms and machines. The realization of the desired law of motion, generation of a given trajectory, regulation and control of the movements of mechanical systems for various machines, devices and devices are also studied.

**PREREQUISITES**: Necessary knowledge of "Mathematics", "Physics", "Theoretical Mechanics".

**TEACHING METHODS**: Lectures conducted with the help of visual materials, real devices, models and models of mechanisms. Laboratory exercises, carried out according to a plan with teaching and methodological guidance, on real stands, equipped with modern systems for registration and computer processing of the measured parameters. Students develop protocols that they defend in front of the teacher.

**METHOD OF ASSESSMENT:** Point system of exam questions or tests, course work and protocols.

**INSTRUCTION LANGUAGE:** Bulgarian

**BIBLIOGRAPHY:**
1. Минчев, Н., Живков, В., Енчев, К., Стоянов, П. Теория на механизмите и машините. София, Техника, 1991, 434 с.; 2. Erdman, A., G., Sandor, G. N. Mechanism Design: Analysis and Synthesis. Prentice-Hall Inc., New Jersey, Vol. 1, 1984, 2-nd Edition, 1991, ISBN 0-13-569872-3.; 3.Shigley, J. E., and J. J. Uicker Jr. Theory of Machines and Mechanisms. McGraw-Hill Book Company, Inc., New York, 1995, 710 p., ISBN 0-07-056930-4.; 4. Chen, F. Y. Mechanics and Design of CAM Mechanisms. Pergamon press, N.Y., 1982, 523 p., ISBN 0-08-028049-8.; 5. Suh, C. H., Radcliffe, C.W. Kinematics and Mechanisms Design. John Willey& Sons, Inc., New York, 1978, 434 p., ISBN 0-471-01461-3.; 6. Левитский, Н. И. Теория механизмов и машин. Москва, Наука, 1990, 592 с.; 7. Вригазов, А., Милков, М., Павлов, Ст. Теория на механизмите и машините. С., 1993, 310 с., ISBN 954-438-038-8.; 8. Uicker J. J., Jr., G. R. Pennock, J. E. Shigley, Theory of Machines and Mechanisms (third ed.), Oxford University Press, New York, 2004, p.734, ISBN 0-19-515598-X.; 9. Machinery's Handbook, John M. Amiss, Franklin D. Jones, Henry H. Ryffel, Industrial Press New York, 2012; 10 CAM DESIGN HANDBOOK, Harold A. Rothbart, 2004 by The McGraw-HIll Companies, Inc.

## DESCRIPTION OF THE COURSE

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|---|---|---|
| Name of the course:<br>**Sport** | Code: **FaSPR04** | Semester: **4** |
| Type of teaching:<br>Lectures (L)<br>Laboratory work (LW)/Tutorials (T)<br>Course work (CW)<br>Self-Study (SS) | Hours per semester:<br>L – 0 hours<br>T – 0 hours<br>LW – 0 hours<br>SS – 30 hours | Number of credits: **1** |
| Course project (CP) | Code: **-** | Number of credits: **0** |

**LECTURER(S)**:

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Sen. Lect. Petar Doganov, PhD (FEA), E-mail: pdoganov@tu-plovdiv.bg,

Sen. Lect. Boris Spasov, PhD (FEA), E-mail: boris_spassov@tu-plovdiv.bg

Technical University of Sofia

**COURSE STATUS IN THE CURRICULUM**: Facultative subject from the curriculum / curricula for training of students to obtain Bachelor's degree, specialty „Mechanical and Instrument Engineering“, „Mechatronics“, „Mechanical engineering and technologies“, „Autotransport machinery“, Professional orientation 5.1 Mechanical engineering, Professional field 5 Technical Sciences.

**AIMS AND OBJECTIVES OF THE COURSE:** Targeted at further developing of students' physical activities, skills and hygiene habits through effective methods of physical education, improving their mental and physical performance.

**DESCRIPTION OF THE COURSE:** The knowledge and skills in Physical Education and Sports develop a wide range of motor skills and habits, help the hardening of the body and contribute to the moral development of students. The enhancement of physical skills is carried out through: 1. General Physical Preparedness – in these seminars the students develop a wide range of motor skill and habits; work to improve strength, speed, endurance, flexibility, structure and skill; increase resistance to unfavourable environmental factors; develop their physical qualities and experience. 2. Sports-Specific Physical Preparedness – students improve their sport skills and habits in a specific sport and gain experience through participation in competitions; work to improve strength, speed, endurance, flexibility, structure and skill; increase resistance to unfavourable environmental factors; develop their physical qualities and experience.

**PREREQUISITES:** The curriculum presumes the minimum of knowledge and skills acquired at secondary school.

**TEACHING METHODS**: Seminars in accordance with the curriculum in PE and Sport.

**METHOD OF ASSESSMENT:** Evaluation is based on functional tests at the end of semester. Lecturer's signature is required at the end of semester and "Pass grade.

**INSTRUCTION LANGUAGE:** Bulgarian

**BIBLIOGRAPHY:**
1. Владимиров В. Туризъм и ориентиране. Методическо ръководство за студентите от ТУ София, филиал Пловдив. Издателство на ТУ - София. 2010.