DESCRIPTION OF THE COURSE

Name of the course: **Life Cycle Management**	Code: **MpMEH01**	Semester: **1**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 30 hours T – 0 hours LW – 30 hours CW – yes	Number of credits: **4**

LECTURER(S):
Assoc. prof. Eng. Nikolaj Katrandzhiev, PhD (FME), 659 715email: nkatrandzhev@tu-plovdiv.bg
Assist. Prof. Stefan Georgiev, PhD (FME), tel.: 659 716; email: s_georgiev@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Master's degree, specialty Mechatronics, Professional orientation 5.1 Mechanical Engineering, Field 5 Technical Sciences.

COURSE OBJECTIVES: students to acquire and deepen their knowledge of the different policies, techniques and strategies by which to manage the market performance of the mechatronic product through the different phases of its life cycle.

COURSE DESCRIPTION: Main topics: The organization as an managing object, Market of the organization, Development of the marketing mix, Product policy, Mechatronic product lifecycle management, Marketing strategies for managing the mechatronic product life cycle, Marketing research, Consumer behavior, Pricing policy and Pricing, Production Process, Production Type, Quality Management, Distribution, Logistics, Product Sales, Advertising and Non-Advertising Marketing Means for User Impact, Service Management, Organization Information System Management.

TEACHING METHOD: Lectures using presentations, discussions with the active participation of students after pre-training. Laboratory exercises - group work for solving case studies.

METHODS OF TESTING AND EVALUATION: final assessment, which is formed by two components: Exam test with a coefficient of gravity 0.60 and an assessment of the course work with a coefficient of 0.40.

LANGUAGE OF INSTRUCTION: Bulgarian

LITERATURE RECOMMENDED: Main literature 1. Donchev, D., Velev, M., Dimitrov, Y., Biznes ikonomika, Softtreyd, Sofiya, 2003 2. Ivanov, I., Osnovi na menidzhmanta, Makros, Plovdiv, 2003 3. Kuzmanov, G., Upravlenie na kachestvoto, ADG, Plovdiv, 2007 4. Tsvetkov, G., Proizvodstven menidzhmant, Softtreyd, Sofiya, 2006 5. Dakov, I., Proizvodstven inzhenering, Lyuren, Sofiya, 2003 6. Dimova, N., Marketing aspects of emotional shopping, NBU, 2013 7. Mladenova, G., Dimova, N., Fundamentals of Marketing, NBU, 2009 8. Markova, B., User behavior, NBU, 2007 9. Sexton, D., Marketing 101, Trump University, Lokus Publishing Ltd., 2009 10. Branson, R., Business of the Future, AMG Publishing 2017; 11. Kaftandjiev, H., Harmony in Advertising Communication, University Publishing House "St. Kliment Ohridski ", Sofia, 2013 12. Kaftandjiev, X., Mythological Archetypes in Communications, University Publishing House "St. Kliment Ohridski ", Sofia, 2015 13. Krusteva, N. Fundamentals of Marketing, Avangard Prima, 2009 14. Krasteva, N., Petrova, I., Strategic Marketing Strategies, Avangard Prima, Sofia, 2007 15. Krasteva, N., Contemporary Marketing, Volume 1, Avangard Prima, Sofia, 2013 16. Krasteva, N., Contemporary Marketing, Volume 2, Avangard Prima, Sofia, 2013 17. Holt, D., How Marks Turn into Icons, Bookmark, Sofia, 2010 18. Blagoev, V. Marketing, S., 2003; 19. Kotler, F. Marketing Advice from A to Z, S., 2006 20. Kuzmanov, G. Marketing, Pv, 2006 21. Kuzmanov, G.

Management. Practical Course, Fr, 2004 22. Kuzmanov, G. The Firm of Change and Improvement, Pv, 2003 23. Kuzmanov, G.Bulgaria in the EU: New Marketing Realities and Tasks in Business Management, 2007 24. Doganov, D., Z. Mladenov, R. Panova, Marketing, Tests and Tasks, Dictionary, S. Dionis, 2007 25. Kotler, F. and Others, The Evolution of Marketing, S., "Classic and Style", 2003 26. Kotler, F., The Ten Death Sins of Marketing, S., "Locus", 2006 27. Hill, S., 60 Trends, 60 Minutes, S., "Locus", 2006 28. Rees, Al. etc. Non-Modifying 22 Problems of Marketing, S., 2001 29. Kotler, F. Kotler for Marketing, S., 2000 30. Kotler, F. Marketing Management. Structures of Market Supply Management, S., 2002 Additional literature: 1. Kuzmanov, G. Innovative Marketing in the Company. Report at the International Conference.BUS - Burgas.Febber 2006 2. Njodström, K., J. Rijderstrole, Business of the Future, Info Dar, 2003 3. Kuzmanov, G. The Firm of Change and Improvement, VSI, 2002 4. Tright, J., The Big Problems of Major Brands, S., Infodor, 2004 5. Denny, R., Winning Communications, S., SoftPress, 2006 6. Norka, D., Sales Department Manager, Sofia, 2006, 2006 7. Drucker, P., Management in the Next Society, S., "Classic and Style", 2006 8. Rees, Al. etc. The advent of advertising and the rise of public relations, S., "Classics and Style", 2003 9. Buckingham, M., violate all rules, S., "Classics and Style", 2001 10. Drucker, P., Management Challenges of the 21st Century, S., "Classics and Style", 2000

DESCRIPTION OF THE COURSE

Name of the course: **Innovation management and project management**	Code: **MpMEH02**	Semester: **1**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 30 hours T – 15 hours LW – 0 hours	Number of credits: **4**

LECTURER(S):

Assoc. prof. Georgi Georgiev, PhD (FME), 659 706, email: georgi@tu-plovdiv.bg
Assoc. prof. Tanya Gigova, PhD (FME), 659 706, email: gigova@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Master's degree, specialty Mechatronics, Professional orientation 5.1 Mechanical Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to introduce students to the basic concepts and principles of innovation management and project management used in mechatronics.

DESCRIPTION OF THE COURSE: The main problems, means and approaches for innovation management and projects. The content and structure of the innovation process and project management. The main strategies and features of management are presented of innovations and projects.

PREREQUISITES: Knowledge of probability theory, statistics, quality management, economics, management.

TEACHING METHODS: Lectures with the help of slides. Laboratory exercises performed according to methodical instructions and protocols made by the students and checked by the teacher. Multimedia and specialized software are used.

METHOD OF ASSESSMENT: Written exam at the end of the 3rd semester.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1.Танева Н. Иновационен мениджмънт, Кинг ,София 2008. 2. Андреев О. Д., Мениджмънт на проекти, Софттрейд, 2006. 3. ISO 10006:2003, Quality management systems - Guidelines for quality management in projects (IDT). 4. Дюкенджиев Г., Р. Йорданов, Контрол и управление на качеството, Сфоттрейд, София, 2002, ISBN 954-9725-10-3 5. EUROPEAN COMMISSION – EUROPEAID, Project Cycle Management Guidelines, Brussels, 2004. 6. PROJECT MANAGEMENT INSTITUTE, USA, A Guide to the Project Management Body of Knowledge (PMBOK® Guide), 3rd Edition, 2004.

DESCRIPTION OF THE COURSE

Name of the course: **Design of mechatronic systems**	Code: **MpMEH03**	Semester: **1**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 30 hours T – 0 hours LW – 30 hours	Number of credits: **4**

LECTURER(S):
Assist. Prof. Eng. Konstantin Chukalov, PhD (FME), tel.: 659 617, email: chukalov@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Master's degree, specialty Mechatronics, Professional orientation 5.1 Mechanical Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The course aims to acquaint students with promising modern approaches to the design of complex technical systems - especially mechatronic.

DESCRIPTION OF THE COURSE: The course studies the issues of information support of the design process of mechatronic devices and systems, systematic approach to design, order and principles of design, conceptual and structural design, CAD, features of the design of mechatronic modules and systems.

PREREQUISITES: Knowledge of ARP, Industrial Robots, Mechanical Engineering Technology, Fundamentals of Mechatronics, Mathematics, Mechanics is required.

TEACHING METHODS: Lectures delivered with the help of visual aids, slides, slides, videos. Laboratory exercises with the implementation of independent tasks, independent solution of applied course tasks.

METHOD OF ASSESSMENT: Exam at the end of the semester and defense of self-developed protocols from laboratory exercises. The final grade is formed by the grade from the exam - 70% and from the laboratory exercises - 30%.

INSTRUCTION LANGUAGE: Bulgarian BIBLIOGRAPHY: 1. Егоров О., Подураев Ю., Мехатронные модули, расчет и конструирование, М, МГТУ „Станкин“, 2004 г. 2. Ли К., Основы САПР, Питер, 2004 г. 3. Норенков И., Информационная поддержка наукоемких изделий, CALS технологий, М., МГТУ „Бауман“ , 2002г. 4. Норенков И., Основы автоматизиронного проектирования, М., МГТУ „Бауман“, 2002 г

DESCRIPTION OF THE COURSE

Name of the course: **Intelligent Measurement Systems**	Code: **MpMEH04**	Semester: **1**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 30 hours T – 0 hours LW – 30 hours	Number of credits: **4**

LECTURER(S):
Assoc. prof. Eng. Margarita Deneva, PhD (FME), 659 685, email: deneva@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Master's degree, specialty Mechatronics, Professional orientation 5.1 Mechanical Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The purpose of this course is to give knowledge and skills to the students for the methods and meaning for construction of intelligent measurement systems (IMS), for the architecture and programming of these systems.

DESCRIPTION OF THE COURSE: Main topics: Main characteristics of IMS. Architecture of the microprocessor control of IMS. IMS with duplicated structures-principles of construction, efficiency and reliability. Interpretative models of the cumulative error of the measurement process. Models of measurement transducers. Analog to digital convertors and methods for analog to digital conversion. Expert systems in IMS. Purpose and structure of the intelligent sensors. Virtual measurement devices – main characteristics and design principles.

PREREQUISITES: The lectures and laboratory exercises are based on the knowledge from the Bachelor Degree - Physics, Electrical Measurement, Control Theory, Measurement of Non-electrical Quantities.

TEACHING METHODS: Lectures are given with visual materials, posters and slides. Laboratory exercises is organized according to the laboratory manual with reports made by the students and defended in front of the lecturer.

METHOD OF ASSESSMENT: Written examination after the end of the semester (80%) and a mark from the laboratory exercises (20%).

INSTRUCTIONAL LANGUAGE: Bulgarian.

BIBLIOGRAPHY: 1. Калчев, Ив., Интелигентни измервателни системи, ТУ-София, 2006. 2. Арнаудов, Р., Р. Динов, Измервания в комуникациите, ТУ-София, 2007. 3. Пенчев, П., Измервания в електрониката и комутационната техника, УИ „В. Априлов“, Г., 2006. 4. Шевчук, В., Расчет динамических погрешностей интеллектуальных измерительных систем, М., Физматлит, 2008. 5. Mazda, F., Electronic Instruments and Measurement Techniques, Cambridge University Press, 1990. 6. Doebelin, E. and oth., Measurement Sistems – Application and Design, Mc Graw-Hill Book Co, 1990.

DESCRIPTION OF THE COURSE

Name of the course: **Engineering researches**	Code: **MpMEH05**	Semester: **1**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 30 hours T – 0 hours LW – 15 hours CW - yes	Number of credits: **4**

LECTURER(S):
Assist. Prof. Eng. Atanasi Tashev, PhD (FME), tel.: 659 626, email: atanasi.tashev@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Master's degree, specialty Mechatronics, Professional orientation 5.1 Mechanical Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is for students to study the essence of engineering research methods and to be able to apply these methods for research projects and technological purposes in production.

DESCRIPTION OF THE COURSE: Within the course the main methods for experimental - statistical modelling and optimization of objects in mechanical engineering are studied. Issues related to the collection and processing of experimental data and their statistical analysis are considered. The methods of correlation, variance and regression analysis and the main issues related to their application in the active experiment are presented. Procedures for pre-planning and planning the experiment, as well as the interpretation of the results are discussed.

PREREQUISITES: Knowledge of Metrology, Measuring Equipment, Mechanical Engineering Technology, Mathematics is required.

TEACHING METHODS: Lectures delivered with the help of visual aids, slides, slides, videos. Laboratory exercises with the implementation of independent tasks, independent solution of applied course tasks.

METHOD OF ASSESSMENT: Exam at the end of the semester and defense of self-developed protocols from laboratory exercises. The final grade is formed by the grade from the exam - 70% and from the laboratory exercises - 30%.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Андонов И., Приложение на математическата статистика в машиностроенето., С., Техника 1981 г. 2. Активный контроль в машиностроении, под редакции Педь, Машиностроение, Москва, 1971 год. 3. Божанов Е., Вучков И., Статистически решения в производството и научните изследвания. 4. Винарский М.С., Планирование експеримента в технологических изследваниях, Киев, Техника, 1975 г. 5. Стефанова И., Основи на инженерните изследвания, габрово, В.Априлов, 2003

DESCRIPTION OF THE COURSE

Name of the course: **Installation automation**	Code: **MpMEH06.1**	Semester: **1**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 30 hours T – 0 hours LW – 30 hours	Number of credits: **4**
Course project (CP)	Code: **MpMEH08**	Number of credits: **2**

LECTURER(S):
Assoc. prof. Eng. Angel Lengerov, PhD (FME), 659 613, e-mail: anlen@tu-plovdiv.bg
Assist. Prof. Eng. Penko Mitev, PhD (FME), tel.: 659 590, e-mail: penkomitev@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum for training of students to obtain Master's degree, specialty Mechatronics, Professional orientation 5.1 Mechanical Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course the discipline "Automation of installation" is through a systematic approach to give the basics knowledge and skills of students related to the requirements for the construction of mechatronic products in terms of high-performance automatic production and installation, the theory of automatic production, technological and organizational aspects of flow assembly and the main stages of creating technical means for automated assembly.

DESCRIPTION OF THE COURSE: The course considers the prerequisites and ways to improve the installation of products and their components, the theory of automatic assembly, the main technological processes for connecting parts and technical means for mechanization and automation of assembly processes. It's an accent systematic approach to installation automation, as well as issues related to the productivity and reliability of the assembly technical means and the achievement of the quality of the assembled products. The ways to increase are analysed the efficiency of the technical means for automation of the installation. By studying the course aims to provide students with knowledge about the possibilities for improvement and automation of installation and skills for choosing the optimal option.

PREREQUISITES: Knowledge of "Technical Drawing", "Mechanics", "Resistance of materials", "Machine elements", "Theory of machines and the mechanisms".

TEACHING METHODS: Lectures are illustrated with videos, transparencies overhead projectors, boards, etc. Exercises are conducted in a specialized laboratory through training and research stands and modern technical means for assembly.

METHOD OF ASSESSMENT: In forming the overall assessment, report the results of laboratory exercises. 2 control tests are performed uses a point system.

INSTRUCTION LANGUAGE: Bulgarian.

BIBLIOGRAPHY:
1.Бояджиев, И., Доцев, Д. Записки от лекции по дисциплината. 2006. 2. Гановски, В. С., И. К. Бояджиев, Т. Д. Нешков и др. Технически средства за механизация и автоматизация на сглобяването. Справочник, С., Техника, 1990 г. 3. Бояджиев, И., Д. Доцев, В. Стоянов, В. Генова. Ръководство за лабораторни упражнения по автоматизация на монтажа. ТУ-София, 1990 г. 4. Гановски, В. С., И. К. Бояджиев, Т. Д. Нешков, Ц. Ликов. Механизация и автоматизация на монтажните процеси в машиностроенето. С., Техника, 1986 г. 5. Lotter, L. Wirtschaftliche Montage. VDI Verlag, 1986. 6. Assembly automation, The international journal of assembly technology and management, ISSN: 0144-5154, Thomson Scientific (ISI) Impact Factor: 0.307, http://engineering.emeraldinsight.com/automation/journals/assembly_automation.htm

DESCRIPTION OF THE COURSE

Name of the course: **Metrological assurance in mechatronics**	Code: **MpMEH06.2**	Semester: **1**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 30 hours T – 0 hours LW – 30 hours	Number of credits: **4**
Course project (CP)	Code: **MpMEH08**	Number of credits: **2**

LECTURER(S):
Assoc. prof. Eng. Pavlinka Kacarova, PhD (FME), 659 636, email: p.kacarova@tu-plovdiv.bg
Assist. Prof. Eng. Kliment Georgiev, PhD (FME), tel.: 659 636, email: k.georgiev@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum for training of students to obtain Master's degree, specialty Mechatronics, Professional orientation 5.1 Mechanical Engineering, Field 5 Technical Sciences.

PURPOSE OF THE COURSE: The course "Metrological assurance in mechatronics" aims to acquaint students with the basic requirements for metrological assurance of measuring tools used in various industries. As well as with the principle of operation of different types of control activity related to inspections, attestation and examination of the means of control. The requirements to them according to the normative documents, laws and standard procedures. The laboratory exercises aim at the students to acquire practical knowledge and skills for performing these metrological procedures, as well as to be able to do metrological assurance in various productions of mechatronics.

DESCRIPTION OF THE COURSE: The course covers a wide range of regulatory requirements related to the conduct of various procedures in metrological assurance. The principles of application of different types of metrological inspections in different measuring instruments are studied. A connection is made between the metrological assurance and the quality management systems. The diagnostics and the preventive maintenance of the different means of control.

PREREQUISITES: Prerequisites: Physics, Mathematics, ME, Materials Science, MIT and KUK.

TEACHING METHODS: Lectures, laboratory work with protocols with written report and individual defense.

METHOD OF TESTING AND EVALUATION: Exam. The final grade is formed by two components: - bearing 70% of the exam question and another 30%. - from the assessment received in defense of LE.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Lecture notes from the lead lecturer. 2. Димитров,Вълева и др.,Ръководство за лаб.упражнения по основи на метрологията и техническите измервания,София,Техника 3.Радев. Хр. Метрология и измервателна техника,справочник Том 1 , 2, Първо издание; Софтрейд , 2012г.

DESCRIPTION OF THE COURSE

Name of the course: **Application of mechatronic systems in discrete production**	Code: **MpMEH07.1**	Semester: **1**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 30 hours T – 0 hours LW – 30 hours	Number of credits: **4**
Course project (CP)	Code: **MpMEH08**	Number of credits: **2**

LECTURER(S):
Assoc. prof. Eng. Angel Lengerov, PhD (FME), 659 613, e-mail: anlen@tu-plovdiv.bg
Assist. Prof. Eng. Konstantin Chukalov, PhD (FME), tel.: 659 617, email: chukalov@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum for training of students to obtain Master's degree, specialty Mechatronics, Professional orientation 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 the applications of mechatronics in modern production, to look for new opportunities and perspectives in this direction.

DESCRIPTION OF THE COURSE: Within the course are studied applications of mechatronics in intelligent mechatronic modules for movement, service and rehabilitation robots, clinical robots, automated systems of mechanical engineering, non-mechanical industries, in road, water and air transport. PREREQUISITES: Knowledge of CRA, Industrial Robots, Mechanical Engineering Technology, Mathematics, Mechanics is required.

TEACHING METHODS: Lectures delivered with the help of visual aids, slides, slides, videos. Laboratory exercises with the implementation of independent tasks, independent solution of applied course tasks.

METHOD OF ASSESSMENT: Exam at the end of the semester and defense of self-developed protocols from laboratory exercises. The final grade is formed by the grade from the exam - 70% and from the laboratory exercises - 30%.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Витанов Н., Димитрова З., Какво е мехатрониката и за какво е нужна, сп. „Българска наука“, 87бр., 2020 г. 2. Хазенбринк, Коблер, Основи на пневматичното автоматично управление, Festo 3. АсеновД., Програмиране и настройка на машини с ЦПУ, Просвета, 2005 4. Дембовски, Клаус, Сервизен справочник томове: 1,2,3,4, Техника, 2000 г. 5. Колев И., Тодоров Т., Оптрони и приложението им, Техника,1988 г.

DESCRIPTION OF THE COURSE

Name of the course: **Optical and laser technology**	Code: **MpMEH07.2**	Semester: **1**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 30 hours T – 0 hours LW – 30 hours	Number of credits: **4**
Course project (CP)	Code: **MpMEH08**	Number of credits: **2**

LECTURER(S):
Assoc. prof. Eng. Margarita Deneva, PhD (FME), 659 685, email: deneva@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum for training of students to obtain Master's degree, specialty Mechatronics, Professional orientation 5.1 Mechanical Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Students gain theoretical and practical knowledge about the use of optoelectronic and laser units and devices. The emphasis is on the optical-mechanical block of the considered devices, knowledge of their physical principles of operation and basic parameters and characteristics. In the laboratory exercises analytical and experimental researches of the characteristics of optical and optoelectronic systems are carried out. Laboratory exercises give students the opportunity to acquire basic skills and habits for working with optical equipment.

DESCRIPTION OF THE COURSE: Main topics: Methods for describing the emission of real light sources. Principles of operation and parameters of lasers and LEDs. Principles of operation, basic parameters and characteristics of photodetectors, as well as their coordination with the optical unit. Description of random signals and noise in OES. Registration (detection) of the useful signal against the background of noise and interference and determination of the probabilities of errors. Evaluation of a parameter of the useful signal received against the background of noise. Energy design of OES. Pulse and phase laser rangefinders. Optoelectronic devices for determining the coordinates of objects. Spectral instruments. Optoelectronic devices for automation of technological processes.

PREREQUISITES: Basic knowledge of physics and mathematics is required.

TEACHING METHODS: Lectures and laboratory work, supported by boards, technical descriptions and instructions for use of various optical instruments.

METHOD OF ASSESSMENT: Written exam.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Johnson, M., Photodetection and Measurement, NY, McGraw-Hill, 2003; 2.Фердинандов, и др., Световодни комуникационни системи – част I, II, III, С., Сиела, 2001, 2002, 2003; 3. Порфирьев Л.Ф., Осноы теории преобразования сигналов в оптико-электронных системах, Л., Машиностроение, 1989. 4.Фердинандов, Е., Б. Пачеджиева, Б., Вероятностни и статистически методи в комуникациите С., Сиела, , 2005; 5. Barry J.R., Wireless Infrared Communications, Boston, Kluwer Academic Publishers, 1994; 6. Джамийков, Т.С., Оптоелектронни и сензорни елементи, С., и-во на ТУ-София, 2019.

DESCRIPTION OF THE COURSE

Name of the course: **Micro-electromechanical and electronic systems**	Code: **FaMpMEH01**	Semester: **1**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 30 hours T – 0 hours LW – 30 hours	Number of credits: **4**

LECTURER(S):
Assoc. prof. Eng. Margarita Deneva, PhD (FME), 659 685, email: deneva@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Facultattive subject from the curriculum for training of students to obtain Master's degree, specialty Mechatronics, Professional orientation 5.1 Mechanical Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to familiarize students with the complex-microsystem containing blocks of sensors, actuators, signal processing system, mechanical structure, as well as complexes for communications with external systems.

DESCRIPTION OF THE COURSE: The main structural elements that make up the micro-electromechanical and electronic systems are considered - a network of sensors, actuators, signal processing system, mechanical structures and the ways of communication with external devices. The technological sequence for the implementation of the components of the systems is comprehensively studied.

PREREQUISITES: Knowledge of microelectronics, microelectronic circuitry, mechatronic system design, and assembly automation is required.

TEACHING METHODS: Lectures with the use of multimedia projector, Laboratory exercises, performed according to methodological guidelines and protocols developed by the students and checked by the lecturer. Multimedia and specialized software are used.

METHOD OF ASSESSMENT: Ongoing assessment based on protocol scores and two control tests.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Musa Jouaneh Fundamentals of Mechatronics, 2013; 2. Marc Madou "Fundalmentals of Microfabrication" , CRC Press, ISBN 0-8493-9451-1, New York, 1997; 3. William Trimmer Micromechanics and MEMS" , IEEE Press, IEEE Number PC4390, ISBN 07803-1085-3, New York, 1997

DESCRIPTION OF THE COURSE

Name of the course: **Control systems for mechatronic systems and industrial networks**	Code: **MpMEH09**	Semester: **2**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 30 hours LW – 15 hours CW - yes	Number of credits: **3**

LECTURER(S):
Assoc. prof. Eng. Nikola Shakev, PhD (FME), 659 528, email: shakev@tu-plovdiv.bg
Assist. Prof. Eng. Stoiyan Avramov, PhD (FME), tel.: 659 593, email: stav@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Master's degree, specialty Mechatronics, Professional orientation 5.1 Mechanical Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to give students advanced knowledge of current problems of design and application of control in mechatronic systems, with emphasis on the functional features of industrial networks.

DESCRIPTION OF THE COURSE: The course aims to give students knowledge and skills related to current design issues and the application of control in mechatronic systems, with an emphasis on functional features of industrial networks. It is an upgrade over the disciplines from bachelor's degree and has input links to most disciplines, related to intelligent production. It is planned to get acquainted with the main ones functional characteristics and features of the control of mechatronic systems for industrial applications. The main network topologies and protocols in industrial communications at different hierarchical levels - TCP / IP, Industrial Ethernet, PROFIBUS, CAN, as well as the functional features of communication "master-slave" in mechatronic systems. The need to protect communication is justified, modern technologies and devices for realization of ASISafe, PROFISafe and ISA protection when controlling mechatronic systems in real time. The connection is considered between the Internet and industrial communication, as well as trends in the future development of industrial networks.

PREREQUISITES: Knowledge of "Intelligent Production Systems" from educational qualification degree BACHELOR. PREREQUISITES: Control Theory, Electrical Engineering, Electronics, Informatics, Physics, Thermodynamics, Mechanics.

TEACHING METHODS: Lectures are conducted using multimedia projector. Students can get acquainted in advance with materials on the topic of the lecture from the textbook on the course and at the indicated WEB address. The laboratory exercises are conducted in a laboratory of "Intelligent Production Systems".

METHOD OF ASSESSMENT: Written exam - test.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. T. Neshkov, S. Jordanova, I. Topalova, Process control and Production automation, учебник - English Language Department of Engineering, 2007, ELDE, TU-Sofia. 2. T. Neshkov, S. Jordanova, I. Topalova, Process control and Production automation, Tutorials Part I - English Language Department of Engineering, 2007, ELDE, TU-Sofia. 3. I.Topalova, T.Neshkov,S. Jordanova, Process control and Production automation – Laboratory Manual Part II - English Language Department of Engineering, 2008, ELDE. 4. Нешков, М.Милушев, И.Топалова, Ръководство за лабораторни упражнения по „Системи за управление на автоматични комплекси" 2005, ТУ-София.

DESCRIPTION OF THE COURSE

Name of the course: **Automotive Mechatronics**	Code: **MpMEH10**	Semester: **2**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 30 hours T – 0 hours LW – 15 hours CW - yes	Number of credits: **3**

LECTURER(S):
Assoc. prof. Eng. Krasimir Ambarev, PhD (FME), 659 518, email: kambarev@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Master's degree, specialty Mechatronics, Professional orientation 5.1 Mechanical Engineering, Field 5 Technical Sciences.

DESCRIPTION OF THE COURSE: Main topics: Basic principles, architecture and classification of electronic systems in cars; Automotive networking and bus systems, Automotive sensors and actuators; Process control systems in internal combustion engines; Electronic transmission control; Antilock braking system (ABS); Traction control system (TCS); Electronic stability program (ESP); Automatic brake functions; Active steering; Drive and adjustment systems; Heating, ventilation and air conditioning; Vehicle security systems; Fault diagnostics.

PREREQUISITES: Basic knowledge of Control Theory, Electronics, Informatics, Physics, Thermodynamics, Mechanics.

TEACHING METHODS: Lectures with the help of multimedia. Laboratory exercises with protocols.

METHOD OF ASSESSMENT: Written exam and course work.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Димитров Й., Б.Трайков, К. Косев. Автомобилна техника. С., Техника, 2006; 2. Умнов В.П., Шарапов А.М. Электрические машины и аппараты: теория, устройство и применение в автомобилях, Учебное пособие, Владимир: Владимирский государственный университет им. А.Г. и Н.Г. Столетовых (ВлГУ), 2020; 3. Automotive Electrics, Automotive Electronics. 5-th edition. Robert Bosch Gmbh, 2007; 4. Reif, Konrad, Automotive Mechatronics - Automotive Networking, Driving Stability Systems, Electronics, Springer, 2015; 5. Tom Denton. Advanced Automotive fault diagnosis. Second edition, Elzevier Science (USA), 2006; 6. Tom Denton. Automobile electrical and electronic systems. Third edition. Elzevier Science (USA), 2004; 7. William B. Rubbens. Understanding Automotive Electronics. Sixth edition, Elzevier Science (USA), 2003; 8. Kiencke U., L. Nielsen. Automotive control systems (for engine, driveline and vehicle), SAE, Springer, 2000; 9. Diesel engine management. 2-nd updated and expanded edition. Robert Bosch Gmbh, 1999; 10. Driving safety systems. 2-nd updated and expanded edition. Robert Bosch Gmbh, 1999.

DESCRIPTION OF THE COURSE

Name of the course: Integrated production	Code: **MpMEH11**	Semester: **2**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 30 hours T – 0 hours LW – 15 hours	Number of credits: **3**

LECTURER(S):
Assoc. prof. Eng. Vanya Georgieva, PhD (FM), 02 956 3767, email: vgeorgieva@tu-sofia.bg
Assist. Prof. Eng. Penko Mitev, PhD (FME), tel.: 659 590, e-mail: penkomitev@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Master's degree, specialty Mechatronics, Professional orientation 5.1 Mechanical Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The course acquaints students with the basic discrete production structures, their automation and information integration.

DESCRIPTION OF THE COURSE: The course presents the main types of discrete production systems, models of their work and metrics, structures for automation of the production process and assembly (orientation, transport, storage), robotics (kinematics, industrial environment, control and programming) and identification of objects and data processing.

PREREQUISITES: Basic knowledge of the disciplines is required: physics, mechanics, informatics, industrial production systems, production design.

TEACHING METHODS: Lectures using slides. Laboratory exercises in a computer class and / or laboratory with stands. Individual or team work with preparation of e-protocols and protection.

METHOD OF ASSESSMENT: Two written tests (at the end of the semesters) with a duration of 1 academic hour, with a weight in the overall assessment - 80% (up to 80 points). The remaining 20% (up to 20 points) are formed by the current control and the presentation of the protocols from the laboratory exercises.

INSTRUCTIO LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Слайдове на лекциите; 2. Groover M. P., 2008, Automation, Production Systems, and Computer Integrated Manufacturing, Pearson Education Inc. ISBN 0-13-207073-1; 3. Assembly automation, The international journal of assembly technology and management, ISSN: 0144-5154, Thomson Scientific (ISI); 4. Lotter, L. Wirtschaftliche Montage. VDI Verlag, 1986; 5. Gershwin S., B., 1994, Manufacturing systems engineering, ISBN 0-13-560- 608X. 6. De Ron A., J., 1999, Performance measures for technical production systems, Eindhoven University of technology, School of industrial Engineering and management science, Syllabus; 7. Lin Zhang at all, 2014, Cloud manufacturing: a new manufacturing paradigm, Enterprise Information Systems, Vol. 8, 167-187. 8. Neshkov, T., 2013, Introduction to the speciality machatronic systems, University Textbook, Heron Press Ltd, ISBN 978-954-580-329-1, 9. Gerhard Pahl, Wolfgang Beitz, Jorg Feldhusen, Karl-Heinrich Grote, 2007, Engineering Design. A Systematic Approach, , Springer-Verlag London Limited, ISBN-10: 1846283183

DESCRIPTION OF THE COURSE

Name of the course: **Motion Control in Mechatronic Systems**	Code: **MpMEH12.1**	Semester: **2**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 30 hours T – 0 hours LW – 15 hours	Number of credits: **3**
Course project (CP)	Code: optional project	Number of credits: **0**

LECTURER(S):
Assoc. prof. Eng. Sevil Ahmed, PhD (FAE), tel. 659 585, email: sevil.ahmed@tu-plovdiv.bg,
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum for training of students to obtain Master's degree, specialty Mechatronics, Professional orientation 5.1 Mechanical Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The aim is delivering knew knowledge and experience on motion control in mechatronic systems. Mathematical and structural descriptions of specific problems are concerned as basics of design and exploitation of this kind of systems.

DESCRIPTION OF THE COURSE: Students get knowledge about: the structure, the mathematical description, the types of signals and the management of the coordinates of the movement of mechatronic systems; the implementation of speed, position, trajectory control loops; and necessary linearized models and their respective structural schemes. Structure of the course: Elements and properties of control systems for mechatronics - technical realizations (of converters, motors, actuators). Concerned controllers: analogy and digital implementation of conventional controllers; programmable logic controllers, intelligent control algorithms. The course project is optional.

PREREQUISITES: Knowledge of the following subjects is required: Theory of signals and an Signal Processing; Fundamentals of design of mechatronic systems; Elements and mechanisms of mechatronic systems; Modelling and simulation of mechatronic systems; Electronic control and control devices.

TEACHING METHODS: Lectures, including multimedia methods, and laboratory exercises with assessed presentation of experiment reports.

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

INSTRUCTION LANGUAGE: Bulgarian.

BIBLIOGRAPHY: 1. Михов М., Системи за управление на електрозадвижванията, Технически университет - София, 2006; 2. Михов М., Системи за електрозадвижване, Технически университет - София, 2006; 3. Костов И., Електрозадвижвания с постояннотокови, асинхронни и синхронни двигатели, Пловдив, 2016, ISBN 978-619-90128-0-2; 4. Bolton W., Programmable logic controllers, CRC Press, 2009, p.398, ISBN: 978-1-85617-751-1; 5. Bolton W., Mechatronics, Sixth Edition, Pearson, 2015, p.663, ISBN 978-1-292-08159-5; 6. Интернет адреси на фирмите Siemens, MathWorks, Allen Bradley, SEW-Eurodrive, Omron; 7. Frank L. Lewis, Darren M. Dawson, Chaouki T. Abdallah, Robot Manipulator Control: Theory and Practice (Automation and Control Engineering), Edition: 2nd, CRC Press, ISBN-13: 978-0824740726.

DESCRIPTION OF THE COURSE

Name of the course: **Micromechanical technique**	Code: **MpMEH12.2**	Semester: **2**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 30 hours T – 0 hours LW – 15 hours	Number of credits: **3**
Course project (CP)	Code: optional project	Number of credits: **0**

LECTURER(S):
Assist. prof. Eng. Dimityr Dimitrov, PhD (FME), tel. 659 658, email: ddimitrov_tu@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum for training of students to obtain Master's degree, specialty Mechatronics, Professional orientation 5.1 Mechanical Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The course aims to give students the necessary knowledge about the nature of microsystems, their modelling, with the basics of design, application and technology for the production of micromechanical elements.

DESCRIPTION OF THE COURSE: The main topics concern: Functional structure of positioning system. Drive, gears, clutches, displacement reporting systems. Rotary and translational drives movements in precision engineering. Drives for small movements. Sensors. Laser interferometers. Analysis of sensor connection schemes. Accuracy of positioning systems. Mechanisms with elastic units. Elastic guides. Optical mechanical systems. Nano position systems. Scanning microscopes with probe head. Principles of construction used in precision engineering.

PREREQUISITES: Physics, Chemistry, Electrical Engineering, Electronics, Fundamentals of Mechatronic Systems Design, Elements and Mechanisms of Mechatronic Systems, Precision Mechanical Systems in Mechatronics, Fundamentals of Optics, Sensors and Actuators, Materials Science, Optoelectronics and Laser Engineering.

TEACHING METHODS: Lectures, using slides. Laboratory exercises performed by students in methodological manuals for work, design and protection of protocols from laboratory works, elaboration of an abstract.

METHOD OF ASSESSMENT: Two one-hour written ongoing assessments in the middle and the end of the semester (60% in total), defence of abstracts and laboratory protocols exercises (40%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Лаврищева В.П., Въведение в фотолитографию, 1977. 2. Онегин Е.Е., Точное машиностроение для микроелектроники, Машиностроение, М., 1986. 3. Pelesko J. A., D. H. Bernstein. Modeling MEMS and NEMS, CRC Press, 2002, ISBN: 4. 1584883065. 4. Cad-el-Hak M. The MEMS Handbook, CRC Press2001,, ISBN: 0849300770. 5. Madou M. J. Fundamentals of Microfabrication: The Science of Miniaturization, Second Edition, CRC Press, ISBN: 0849308267, 2002. 6. Popovic G.Manufacturing Processes for Micromechanical Components, FSRM, 1997 7. Gianchandani Yogesh B., Tabata O, Zappe H, Comprehensive Microsystems, Elsevier, 2007, p.1805 8. Stephen Beeby, Graham Ensell, Michael Kraft, Neil White, MEMS Mechanical Sensors, Artech House, Inc., 2004, 281 p. 9. Nadim Maluf, Kirt Williams, An Introduction to Microelectromechanical Systems Engineering, Second Edition, Artech House, Inc., 2004, 305 p. 10. Mohamed Gad-el-Hak, MEMS Introduction and Fundamentals, Taylor & Francis Group, LLC, 2006, 469p.

DESCRIPTION OF THE COURSE

Name of the course: **Design and implementation of automated mechatronic complexes in discrete production**	Code: **MpMEH13.1**	Semester: **2**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 30 hours T – 0 hours LW – 15 hours	Number of credits: **3**
Course project (CP)	Code: optional project	Number of credits: **0**

LECTURER(S):
Assoc. prof. Eng. Angel Lengerov, PhD (FME), tel. 659 613, e-mail: anlen@tu-plovdiv.bg;
Assist. Prof. Eng. Penko Mitev, PhD (FME), tel.: 659 590, e-mail: penkomitev@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum for training of students to obtain Master's degree, specialty Mechatronics, Professional orientation 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 the design and sealing of automated mechatronic complexes in modern production, to look for new opportunities and prospects in this direction.

DESCRIPTION OF THE COURSE: Within the course basic concepts of automated systems and complexes, systems approach and systems analysis are studied. Students get acquainted with the definitions, classifications, building blocks, constructions and methods for designing automatic lines, automatic technological modules and flexible production systems.

PREREQUISITES: Knowledge of CRA is required, Industrial robots, Mechanical engineering technology, Mathematics, Mechanics.

TEACHING METHODS: Lectures, given using illustrative materials, including: multimedia, transparencies, boards, etc. Laboratory exercises conducted in a specialized laboratory in the presence of laboratory stands and manuals for laboratory exercises. For experimental research, students develop tasks that are accepted by the teacher.

METHOD OF ASSESSMENT: Lectures, given with the help of visual aids, slides, slides, videos. Laboratory exercises with independent tasks, independent solving of applied course tasks.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Шопов И., Автоматизирани производствени системи, ТУ София Филиал Пловдив, 2016 год. 2. Гановски, Бояджиев, Клочков, Автоматични линии, ТУ, София, 1989 год. 3. Гановски В., Автоматизация и автоматични линии в машиностроенето, София, Техника,1986 год. 4. Хаджикосев Г., Автоматизирани производствени системи, София,ТУ, 2009 г. 5. Шопов И, Чакърски Д., Автоматизиращи устройства, София, ТУ, 2019 год.

DESCRIPTION OF THE COURSE

Name of the course: **Accuracy and reliability of mechatronic systems**	Code: **MpMEH13.2**	Semester: **2**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 30 hours T – 0 hours LW – 15 hours	Number of credits: **3**
Course project (CP)	Code: optional project	Number of credits: **0**

LECTURER(S):

Assoc. prof. Eng. Silviya Salapateva, PhD (FME), tel. 659 613, e-mail: sisisal@tu-plovdiv.bg;
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum for training of students to obtain Master's degree, specialty Mechatronics, Professional orientation 5.1 Mechanical Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is for students to learn and can apply methods and technical tools for design, testing and maintaining the accuracy and reliability of mechatronic systems.

DESCRIPTION OF THE COURSE: The basics of the accuracy and reliability of mechatronic systems, ways to ensure their design and operation. The laboratory exercises give skills for working with measurement tools and solving practical problems.

PREREQUISITES: Knowledge in mathematics, physics, mechanics, drawing, machine components, material science, metrology.

TEACHING METHODS: Lectures are taught using transparencies, lantern-slides, and video. Students solve individual tasks during laboratory works, as well as individual course works.

METHOD OF ASSESSMENT: Continuous assessment.

INSTRUCTION LANGUAGE: Bulgarian.

BIBLIOGRAPHY: Basic literature 1. Метрология и измервателна техника. Справочник, под ред. на проф. д.т.н. Хр. Радев, С., Софттрейд, 2008; 2 Харт Х., Въведение в измервателната техника, С., Техника, 1982; 3. Макс Ж. - Методы и техника обработки сигналов при физических измерениях. М., Мир, 1983. Further reading 1. Боднер В., А.Алферов, Измерительные приборы, Издательство стандартов. 2. Профос П., Измерения в промышленности, М., Металлургия,1990. 3. Хофман Д., Техника измерений и обеспечение качества, М., Энергоатомиздат, 1983. 4. Beckwith T., R. Marangoni, J. Lienhard, Mecanical measurements, Massachusetts, Addison Wesley, 1993. 5. Doebelin E., Measurment systems, N.Y., McGraw-Hill, 1990.

DESCRIPTION OF THE COURSE

Name of the course: **Computer Aided Modelling and Analysis of Mechanical Systems**	Code: **FaMpMEH02**	Semester: **2**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 30 hours T – 0 hours LW – 30 hours	Number of credits: **4**

LECTURER(S):
Assoc. prof. Eng. Angel Lengerov, PhD (FME), tel. 659 613, e-mail: anlen@tu-plovdiv.bg;
Assist. Prof. Eng. Penko Mitev, PhD (FME), tel.: 659 590, e-mail: penkomitev@tu-plovdiv.bg

COURSE STATUS IN THE CURRICULUM: Facultative subject from the curriculum for training of students to obtain Master's degree, specialty Mechatronics, Professional orientation 5.1 Mechanical Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to give the students basic knowledge and skills in computer modelling and analysis at the design stage of machine building and processes development.

DESCRIPTION OF THE COURSE: This course studies basic principles, methods and means for computer modelling and analysis of mechanisms and processes in hoisting machinery and systems. It also studies basic and specific interactions and processes in the field of hoisting machinery. The course lies on the basic knowledge in Mathematics, Theoretical Mechanics Theory of Machines and Mechanisms and Strength of materials and also on additional knowledge in mathematical and computer modelling.

PREREQUITESS: Students should have basic knowledge in: Mathematics, Statics and Kinematics, Dynamics and Strength of Materials.

TEACHING METHODS: Lectures are aided by the means of computer oriented descriptive and demonstration programs. Laboratory works are held in computer class using variety of modeling software. Students develop and solve individual problems under the methodological guidance of the lecturer. For the laboratory works there are written textbooks. Additional text are developed and supplied by the lecturer. Separately – users guides of the custom software applied is available.

METHOD OF ASSESSMENT: Continuous assessment.

INSTRUCTION LANGUAGE: Bulgarian.

BIBLIOGRAPHY:
1. Стойчев, Г. Метод на крайните елементи. Якостен и деформационен анализ. С., 2000; 2. Янакиев, А., Георгиев, М. Моделиране на подемно-транспортни машини и системи. Ръководство. Издателство на ТУ – София, 1996; 3. Зенкевич, О. Метод конечных елементов в технике. Мир, 1976; 4. Akin, J. Finite Element Method for Undergraduates. Academic Press, 1990; 5. Fenner, D. N. Engineering Stress Analysis. John Wiley, 1987; 6. Tuma, J., Cheng, F. Dynamic structural Analysis. McGraw-Hill. 1988; 7. Braess D. Finite elements. Third Edition. Univ. Press, Cambridge, 2007-2010.