DESCRIPTION OF THE COURSE

Name of the course **Process Control and Production Automation**	Code: **MpIEe01**	Semester: **3**
Type of teaching: Lectures, tutorials and laboratory work	Lessons per week: L - 30 hours; TW -15 hour; LW - 15 hour	Number of credits: **5**

LECTURERS:

Assoc.Prof. Ph.D. Ivan Ganchev, tel.: 032 659 585, email: ganchev@tu-plovdiv.bg

Technical University of Sofia, Branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Compulsory for the students specialty Industrial Engineering MEng programme of the Faculty of Electronics and Automation, FEA.

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course the students will be able to model the processes taking place in industrial installations from the continuous and discrete production plants, to design and tune both process control and production automation systems, to apply industrial controllers and simulation techniques for investigations of the designed systems.

DESCRIPTION OF THE COURSE: Main topics: Control process classification, control objectives, configurations and strategies; Mathematical modelling of basic processes - mass or energy transportation, mixing, heating, fluid flow systems, chemical reactions, heat exchange, distillation; Feedback, feedforward, ratio, multi-loop control and cascade techniques; Smith predictor; Multivariable, adaptive, inferential and robust control systems; Application of fuzzy logic and neural networks for process control; Flow, pressure, liquid level, temperature and composition control; Boolean algebra, Automata theory; Synthesis and minimization of logical functions; Programmable logic controllers (PLC) - elements, input-output modules, programmers, programming languages, user interface, programming of logical functions, arithmetical operations, PID controller, switching logic control; SFC programming; Discrete automation systems; Queuing systems; Synchronization and optimization of the operation of production systems. SCADA and MES systems. Remote access.

PREREQUISITES: Control Engineering, Advanced Control Theory, Systems Modelling and Simulation, Computer Integrated Manufacturing.

TEACHING METHODS: Lectures, using multimedia and case studies, tutorial and laboratory work from laboratory manual, protocols preparation and defense.

METHOD OF ASSESSMENT: A three-hours written exam (70%) plus tutorials (15%) and laboratories (15%)

INSTRUCTION LANGUAGE: English

BIBLIOGRAPHY: 1. Neshkov T., S.Yordanova and I.Topalova. Process Control and Production Automation. TU-Press, S., 2007; 2. Yordanova S., T. Neshkov and I. Topalova, Process Control and Production Automation - Tutorials. TU-Press, S., 2007; 3. Morari M. B. Zafiriou, Robust Process Control.Prentice Hall, N.J., 1989; 4. Ross T.J. Fuzzy Logic with Engineering Applications. McGraw Hill, Inc., 1995; 5. Shinskey F.G. Process Control Systems: application, design, adjustment. 2nd ed., McGraw-Hill, 1979; 6. Stephanopoulos G. Chemical Process Control. An Introduction to Theory and Practice. Prentice Hall, 1984; 7. Haykin S. Neural Networks: A comprehensive foundation. 2nd ed., Prentice Hall, 1994; 8. Cassandrass C., Lafortune S. Introduction to Discrete Event Systems. 2nd ed., Springer, 2008; 9. Chryssolouris G. Manufacturing Systems: Theory and Practice. 2nd ed., Springer, 2008; 10. Kelton D., Simulation with Arena, McGraw Hill Higher Education, 4th ed., 2006; 11. Berger H, Automating with STEP 7 in LAD and FDB: SIMATIC S7-300/400 Programmable controllers, 2012; 12. Programming Guideline for S7-1200/S7-1500, SIEMENS, 2014.

DESCRIPTION OF THE COURSE

Name of the course **Manufacturing Management**	Code: **MpIEe02**	Semester: **3**
Type of teaching: Lectures (L) and Tutorials (T)	Lessons per semester: L - 30 hours; T - 15 hour	Number of credits: **4**

LECTURER: Assoc. Prof. Boryana Pachedjieva, PhD, mob: +359 32 659 708

E-mail: pachedjieva@yahoo.com

Technical University of Sofia, Branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Compulsory course in the curriculum for MEng in Industrial Engineering, at the Faculty of Electronics and Automation (FEA).

COURSE OBJECTIVES: The aim of the course is MEng students first semester to gain knowledge on the fundamental behavior of manufacturing systems. Systematically accumulated knowledge will enable students, as future engineers and managers, to identify and work confidently with natural trends in the production environment

COURSE DESCRIPTION: The knowledge gained in this course will help students, as future engineers, to identify opportunities to optimize existing systems or build new more efficient ones, to coordinate and manage projects from various areas of manufacturing and to choose appropriate material-handling equipment.

At the end of the course the students,

- will have the ability to work with some popular at present software products for building simulation models and projects of production and storage processes;
- will be familiar with the principles of material-handling and will be able to solve problems by building computer models and performing simulations;
- will be able to handle modern methods and tools in predicting inventory levels and monitoring production;

PREREQUISITES: Production Operations Management, Calculus, Operations Research, CAD, Informatics

TEACHING METHODS: Use of audio-visual aids, computer presentations, animations, models that clearly present problems and modern tends in forecasting, identification and analysis of throughput and bottlenecks, optimization, computer modeling and simulations. During the tutorials, students are introduced to a variety of software products, problems and case studies in the manufacturing management.

METHODS OF ASSESSMENT: Achieving the course objective is monitored by a written final exam at the end of the semester. The maximum number of points for each problem or exam question are clearly indicated during the exam.

INSTRUCTIONAL LANGUAGE: English

REFERENCES:

1 Ray S., Introduction to Materials Handling, New Age International, 2008;
2 Hopp W., M. Spearman, Factory Physics, Mc-Graw-Hill/Irwin 2000;
3 Halevi G., Handbook of Production Management Methods, Butterworth-Heinemann, 2001;
4 Muller M., Essentials of Inventory Management, AMACOM, 2003;
5 Wilson L., How to Implement Lean Manufacturing, Mc-Graw-Hill, 2010;
6 Pham H, Springer Handbook of Engineering Statistics, Springer-Verlag, 2006.

DESCRIPTION OF THE COURSE

Name of the course: **Electric Power System Management**	Code: **MpIEe03**	Semester: **3**
Type of teaching: Lectures, tutorials and laboratory work	Lessons per semester: L -30 hours; T – 15 hours, LW - 15 hours	Number of credits: **4**

LECTURERS: Assoc.Prof. Dr. Maria Kaneva, tel.: 965 20 79, e-mail mkaneva@tu-sofia.bg
Assoc.Prof. Dr. Dimo Stoilov, tel.: 965 2103, e-mail dstoilov@tu-sofia.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM:

Compulsory for the student specialty Industrial Engineering MEng programme of the English Language Faculty of Engineering.

AIMS AND OBJECTIVES OF THE COURSE:

To offer basic knowledge for power system's specifics, requirements and management for the purposes of its operation and development, new concepts related to the restructuring and deregulation.

DESCRIPTION OF THE COURSE:

The main topics: Electric power system (EPS) structure and elements. Specifics of electricity production, transmission and distribution; quality of electric energy - frequency and voltage control; short circuits and stability studies; EPS protection; essential managerial functions in EPS: forecasting, planning, operation management, organization of EPS and its elements, production management; technical and economic characteristics of main equipment, production scheduling, unit commitment, economic dispatch, pricing and load management, demand side management, deregulation and electricity market.

PREREQUISITES:

Physics, Mathematics, Operational Research, Electrical Engineering.

TEACHING METHODS:

Lectures illustrated with presentations, tutorials -individual and team work, protocols, laboratory work with tests and individual protocols.

METHOD OF ASSESSMENT:

A two-hours assessments at the end of semester - 80%, tutorials (homework, attendance, etc.) - 10%, laboratory work - 10%.

INSTRUCTIONAL LANGUAGE: English.

BIBLIOGRAPHY:

1. Allen J. Wood, Bruce F. Wollenberg, Gerald B. Sheble, Power Generation, Operation and Control, John Wiley and Sons, Third Edition, New York, 2013
2. Gan D., Feng D., Xie J., Electricity Markets and Power System Economics, CRC Press, 2013
3. Charles A. Gross, Power system analysis, Wiley, 1986
4. Kirschen D.S., G.Strbac, Fundamentals of Power System Economics, John Willey & Sons, 2004
5. Casazza J. F. Delea. Understanding Electric Power Systems - An Overview of the Technology and the Marketplace, IEEE Press, John Wiley & Sons, Inc., 2003
6. Hadjsaid N., Sabonnadiere J. C., Smart Grids, Wiley-ISTE, 2012
7. Paul Breeze, Power Generation Technologies, Newnes, 2014
8. Gilbert M., Renewable and Efficient Electric Power Systems, Wiley-IEEE Press, 2004

OPTIONAL SUBJECTS LIST -1

List 1 (MpIEe04 - ECTS 4)

MpIEe04.1 - Organizational Behavior

MpIEe04.2 - Knowledge Management

DESCRIPTION OF THE COURSE

Name of the course: **Organizational Behavior**	Code: **MpIEe04.1**	Semester:**3**
Type of teaching: Lectures, tutorials.	Lessons per semester: L -30 hours; T – 15 hours	Number of credits: **4**

LECTURER: Assoc. Prof. Toni Mihova, PhD, tel.:032 659 714, e-mail:mihova@tu-plovdiv.bg

COURSE STATUS IN THE CURRICULUM: Optional for the students specialty

Industrial Engineering MEng programme of the Faculty of Electronics and Automation, FEA

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course the students are expected to be able to apply the methodology for modeling and managing individual, group and organizational behavior and development in different functional areas and though different organizational perspectives - short, middle and long with the aim analyze management-organizational situations and to solve management and organizational problems.

DESCRIPTION OF THE COURSE: The main topics concern: Introduction to organization, management and organizational behavior. Basic knowledge about development and principles of management as theory and practice (economic organization in pre-industrial epoch - traditional organization and management of direct control; Industrial epoch and organization of command-control structure; Classical approach - Taylor system and classical organizational school. Classical American management; Neo-classical approach and movement for humanization of work; Japanese style of management; Management in Information epoch.); Foundation of Individual Behaviour - Basic motivation concepts and leadership; Foundation of group behavior - Communication and group decision making (Conflict and Inter-group Behavior); Foundation of Organization system (Organizational Structure and Design; Organizational Culture; Management of Organizational Change). **PREREQUISITES:** Foundation of Management (Theory of Management).

TEACHING METHODS: Lectures, tutorials (case studies of design problems), course work.

METHOD OF ASSESSMENT: Tests at mid and end of semester (30%), tutorials and course work - (70%).

INSTRUCTION LANGUAGE: English.

BIBLIOGRAPHY:

1. Gareth R. Jones. Organizational Theory. Addison-Wesley Publishing Co., 1995, 706 p.; 2. Laurie J. Mullins. Management and Organizational Behavior. Pitman, 2-nd ed., London, 1991, 546 p.;

3. Стефанов Н. Управление на човешкия фактор в организациите - практически насоки.София, Изд. ИСУ, 2011.164 с.

4.

DESCRIPTION OF THE COURSE

Name of the course **Knowledge Management**	Code**: MpIEe04.2**	Semester: **3**
Type of teaching: Lectures and tutorials, Course work	Lessons per semester: L - 30 hours; T - 15 hours	Number of credits: **4**

LECTURER:

Assist. Prof. Ph.D. Yordanka Chobanova,

email: Yordanka.Chobanova@EUI.eu

COURSE STATUS IN THE CURRICULUM: Compulsory for the students specialty Management MEng programme of the English Language Faculty of Engineering.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to give students a basic understanding of knowledge management and how it can be captured, stored, used and re-used for the competitiveness of the organizations.

DESCRIPTION OF THE COURSE: The students would be more successful and competitive after completing the course, as they would know why it is important to capture and preserve the key factor of competitiveness - the knowledge. In our contemporary world succeed those that constantly work on themselves, acquire new knowledge and develop new skills. This is precisely what this course deals with, namely to help managers pay attention on the importance of organizational culture of knowledge sharing. The most expensive lessons are the ones which we learn by our own mistakes. Why not to learn from the mistakes of the others? The effective knowledge management helps companies to avoid some very expensive mistakes. Companies can find working solutions by using the company knowledge base as their high value added asset. The course focuses on the different stages of design and implementation of the knowledge management system and on the specificities of its implementation in the framework of the global business strategy of the company.

PREREQUISITES: Knowledge in Human Resource Management, Management and Economics would be an advantage.

TEACHING METHODS: Lectures are based on PPT. Some practical cases are discussed and analyzed during the seminars.

METHOD OF ASSESSMENT: Class participation during the term; submission of a midterm paper and a final exam in the form of a test. The final grade is a compilation of the midterm paper result and the exam (each with weighting coefficient 0.45) and active participation in discussions during the seminars with weighting coefficient 0.1.

INSTRUCTION LANGUAGE: English

BIBLIOGRAPHY:

1. Copies of the lecture slides - available in Moodle course: http://elfe.tu-sofia.bg/moodle;
2. Hawryszkiewycz I., Knowledge Management, Palgrave Macmillan, 2010;
3 Schwartz D., Encyclopedia of Knowledge Management, Idea Group, 2006;
5. Dalkir K., Knowledge Management in Theory and Pracice. Elsevier, 2011;
6. Davenport Th., Prusak L., Working Knowledge, Harvard Business School Press, 2000.

OPTIONAL SUBJECTS LIST -2

List 2 (MpIEe05 - ECTS 4)

MpIEe05.1 - Energetic and Energy Efficiency

MpIEe05.2 - Robotics and Automation Technology

DESCRIPTION OF THE COURSE

Name of the course **Robotics and Automation**	Code: **MpIEe05.2**	Semester: **3**
Type of teaching: Lectures and tutorial	Lessons per semester: L - 30 hours; T - 30 hours	Number of credits: **4**

LECTURER:

Prof. Andon Topalov Ph.D. tel. 032 659 528, email: topalov@tu-plovdiv.bg
Technical University - Sofia, Branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Optional course in the curriculum for

MEng in Industrial Engineering, at the Faculty of Electronics and Automation, FEA

AIMS AND OBJECTIVES OF THE COURSE: To acquire knowledge in mechanics, control and application of robots in industry and to develop proficiency in industrial applications of robots.

DESCRIPTION OF THE COURSE: The main topics concern: Introduction in robotics; Kinematics and dynamics modeling of manipulation systems; Planning of robotic motions: in joint and Cartesian coordinates; Kinematical control of robots; Contemporary production automation; Robotized industrial operations: welding, painting, assembly, transportation, cleaning, tending of technology machines; Programming of NC machines; Teaching and programming of robots.

PREREQUISITES: Physics, Mechanics, Mathematics.

TEACHING METHODS: Lectures using transparencies and multimedia, tutorials using computer simulations, SCORBOT IX educational robot, and NC ProLight1000 machining center.

METHOD OF ASSESSMENT: Two written open-book tests assessments at mid and end of semester - 45% each, homework and participation - 10%.

INSTRUCTIONAL LANGUAGE: English.

BIBLIOGRAPHY:

1. B. Siciliano, L. Sciavicco, L. Villani, G. Oriolo, Robotics: Modelling, Planning and Control, ISBN 978-1-84628-641-4, Springer-Verlag London Limited 2009.
2. J. J.Craig, Introduction to Robotics: Mechanics & Control, ISBN: 8131718360, Pearson Prentice Hall, Upper Saddle River, NJ, 3rd ed., 2008.
3. The ZODIAC, Theory of Robot Control, C. C. de Wit, B. Siciliano, and G. Basten (Eds), ISBN 3540760547, Springer-Verlag London Limited, 1996.
4. M. W. Spong, Seth Hutchinson, and M. Vidyasagar, Robot Modeling and Control, John Wiley & Sons 2006, ISBN : 978-0-471-64990-8
5. H. Asada and J-J. Slotine. Robot Analysis and Control, Wiley, New York,1986.
3. K.S. Fu, R. C. Gonzalez, and C.S.G. Lee. Robotics: Control, Sensing, Vision, and Intelligence, McGraw-Hill, St Louis, 1987.
6. M. Shahinpoor. Robot Engineering Textbook. Harper and Row, New York, 1987.

DESCRIPTION OF THE COURSE

Name of the course **Application of Computer Modeling and Simulations in Computer Aided Engineering Analyses**	Code: **MpIEe05.3**	Semester: **3**
Type of teaching: Lectures (L) and Tutorials (T)	Lessons per semester: L - 30 hours; T - 15 hours	Number of credits: **4**

LECTURER:

Assoc. Prof. PhD. Yanko Slavchev (Mechanical Engineering Faculty, Technical University of Sofia), phone: 0893 690834, e-mail: ya_slavchev@tu-sofia.bg, ya_slavchev@abv.bg

COURSE STATUS IN THE CURRICULUM: The course is optional and could be selected from the Master's program in Industrial Engineering.

COURSE OBJECTIVES: The aim of the course is students to learn and be able to apply in computer aided engineering analyses the approaches, methods and technical means of computer modeling and simulations.

COURSE DESCRIPTION: The focus is on computer aided analysis (CAA), which is an integral part of modern computer-aided engineering (CAE). By studying some of the most popular modern software products (ANSYS, Maple, PTC.Mathcad, ARENA), the students will acquire skills for their effective application in various fields of engineering analysis.

At the end of the course the student will be

- familiar with the concepts and will be able to work with some of the most popular at the moment software products for engineering analysis;
- accustomed to dealing with interdisciplinary problems and will be able to solve engineering problems by building computer models and performing simulations;
- able to handle some popular numerical solution methods (the finite element method (FEM), Euler, Runge-Kutta, Newmark, etc.), widely used in the studied software products and thus be able to solve various engineering problems;

PREREQUISITES: Key knowledge in **c**omputer-aided design (CAD), mathematics, electrical engineering, strength of materials, mechanics and fluid mechanics, production operations management

TEACHING METHODS: During lectures students are introduced to the essentials of building models and performing simulations on continuous and discrete-event problems. The dynamic nature of computer-aided engineering (CAE) is visually clarified and the trends in the development of computer analysis (CAA) are explained. Various practical cases and applications in numerous engineering fields are presented with multimedia, slides, animations, built models and simulations. During seminars, the students acquire and expand their ability to work with different software products for engineering analysis.

METHODS OF ASSESSMENT: Achieving the course objective is monitored by a final mark that consists of two semester tests and an end-of-semester coursework. The two tests make up 30% of the final mark and the course work makes up the remaining 70%.

INSTRUCTIONAL LANGUAGE: English

REFERENCES:

1 Madenci E., Guven I., The FEM and Applications in Engineering Using ANSYS,Springer, 2006
2 Hicks T. J., Standard Handbook of Engineering Calculations, McGraw-Hill, 2007
3 Bird J., Engineering Mathematics Pocket Book, Newnes, 2008
4 Hutton D., Fundamentals of FEA, McGraw-Hill, 2004
5 Lopez R. J., Advanced Engineering Mathematics, Maplesoft, 2012
6 Sokolowski J., C. Banks, Modeling and Simulation Fundamentals, Wiley, 2010

DESCRIPTION OF THE COURSE

Name of the course **Quality Control Systems**	Code: **MpIEe06**	Semester: **4**
Type of teaching: Lectures and seminars	Lessons per semester: L - 30 hours, S - 30 hours	Number of credits: **4**

LECTURER:

Assoc. Prof. Toni Mihova Ph.D. tel. 032 659 714, mihova@tu-plovdiv.bg

Technical University - Sofia, Branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Compulsory course in the curriculum for MEng in Industrial Engineering at the Faculty of Electronics and Automation, FEA.

AIMS AND OBJECTIVES OF THE COURSE: After completing the course students shall be able to apply the approaches, methods and technical means of quality control systems. That aims to form a mindset of quality assurance and to prepare students for decisions making by determination and assessment of source data and application of modern concepts of quality management in design, production and distribution.

DESCRIPTION OF THE COURSE: The main topics concern: Concepts, philosophy, nature and strategy of quality control systems. System elements and documentation, regulatory environment and supervisory bodies. Management bodies, requirements, responsibilities and powers, and audit. Quality policy and management of human resources. Quality management in the production phase of the product (On-line control). Statistical control (SPC) and applications, causal diagrams, Pareto analysis and other approaches. Quality management at the design stage of the product (Off-line control). The method of Taguchi, parameters and criteria of the planned experiments. Deploying the function of quality (QFD), application for services. Errors and analyzes of their effects (FMEA), applications for project and for process. Total quality management, organization and planning. Just-on-time system. Cost of quality, definition and categorization of costs.

PREREQUISITES: Management of industrial production, Quality Control, Human Resource Management, Mathematics and computer skills.

TEACHING METHODS: Lectures using a digital projector and demo applications, seminars in computer class working out in teams variety of problems.

METHOD OF ASSESSMENT: Final written exam in the form of test scoring system included exercises topics in 65:35% up to 100 points.

INSTRUCTIONAL LANGUAGE: English

BIBLIOGRAPHY: 1. Vorley G. Quality Management - Principles & Practice, 5th Ed., 2012, ISBN 1 904302 02 5; 2. Hoyle D. ISO 9000 Quality Systems Handbook, 6th Ed., B-H, 2009, ISBN 9781856176842; 3. Quality Assurance and Management, Ed. Savsar M., InTech, 2012, ISBN 978-953-51-0378-3; 4. Govindarajan V. Management Control Systems, 12th Ed., McGraw-Hill, 2006, ISBN9780073100890; 5. Velge Ir. W. A. J. J., Ravok Consultancy Group - The Netherlands, Lectures, 1996; 6. Logothetis N. Managing for Total Quality, Prentice Hall, 1992, ISBN 0-13-553512-3; 7. Tannock J. D. T. Automating Quality Systems, Springer Netherlands, 1992, ISBN 9789401050449.

DESCRIPTION OF THE COURSE

Name of the course **Information technologies**	Code: **MpIEe07**	Semester: **4**
Type of teaching: Lectures and laboratory work	Lessons per semester: L - 30 hours; LW - 30 hours	Number of credits: **4**

LECTURER:

Assoc. Prof. Ph.D. Maria Marinova - tel.: 032 659 272, email: m_marinova@tu-plovdiv.bg

Technical University of Sofia, Branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Compulsory course in the curriculum for MEng in Industrial Engineering at the Faculty of Electronics and Automation, FEA.

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course the students are expected to be able to apply Web-based technologies for database systems, multimedia and hypermedia technologies, Internet services.

DESCRIPTION OF THE COURSE: The main topics concern: Information systems and databases, Database languages, Database management systems (DBMS), Multimedia systems and technologies, Image compression, Design and implementation of multimedia applications, Multimedia software-integration tools, global networks and information systems and services, Web and Web services, multimedia documents in Internet.

PREREQUISITES: Computing I, Computing II, Object-oriented programming.

TEACHING METHODS: Lectures, using slides, case studies, laboratory and course work, work in teams, task description preparation and defence.

METHOD OF ASSESSMENT: Exam.

INSTRUCTION LANGUAGE: English

BIBLIOGRAPHY: 1. Malay K. Pakhira, Database Management System, PHI Learning Pvt. Ltd., 2012. 2. Christopher J. Date, SQL and Relational Theory: How to Write Accurate SQL Code, O'Reilly Media, 2009. 3. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer D. Widom, Database Systems: The Complete Book, Prentice Hall, 2008. 4. Thomas Connolly, Carolyn Begg and Anne Strachan, Database Systems, A Practical Approach to Design, Implementation and Management, Addison-Wesley Publishing Company, Inc., 1996. 5. Jeffrey D. Ullman, Principles of Database and Knowledge Base Systems, Volume I, Computer Science Press, 1988. 6. Toolbook II Multimedia Guide, Asymetrix Corporation, 1996. 7. Toolbook II User Manual Guide, Asymetrix Corporation, 1996. 8. Harley Hahn & Rick Stout, The Internet Complete Reference, McGraw-Hills, 1994. 9. ISO 8879: Standard Generalized Markup Language (SGML), 1986. 10. Douglas E Comer, The Internet Book: Everything You Need to Know About Computer Networking and How the Internet Works (4th Edition) Paperback - Amazon, 2006. 11. M. Tamer Ozsu, Principles of Distributed Database Systems, 2011. 12. John Levine, Margaret Levine Young, The Internet of Dummies, 2015.

DESCRIPTION OF THE COURSE

Name of the course **Financial Analysis and Investment**	Code: **MpIEe08**	Semester: **4**
Type of teaching: Lectures and tutorials	Lessons per semester: L - 30 hours; T - 15 hours	Number of credits: **4**

LECTURER: **Assoc. Prof. Snezinka Konstantinova, email: sks ko@abv.bg**

Technical University of Sofia, Branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Compulsory for the students specialty Industrial Engineering MEng programme of the Faculty of Electronics and Automation, FEA.

AIMS AND OBJECTIVES OF THE COURSE: To give knowledge about main principles of the investment management, including assessment of alternative investment projects, analysis of the investment risk and diversification of portfolio. As a conclusion financial markets and investment funds are considered.

DESCRIPTION OF THE COURSE: Introduction to financial management. Financial analysis. Basic financial ratios; Managing the capital structure of the firm; Static and dynamic methods of investment choice; Classifying of alternative investment projects; Methods of calculation of financial securities price and financial assets return; Investment risk analysis. Basic risk factors. Market risk measurement. Methods of risk orientation of the indices; Portfolio risk. Diversification of the portfolio. Capital asset pricing model; Inflation and fiscal effects on the investment decisions; Investment functions of the capital structure. Weighted average cost of capital and marginal cost of capital; Debt financing of the investments and market value of the firm; Financial markets. Managerial strategies in the investment environment; Fundamental and technical analysis of the financial markets. Stock exchange indices; Investment funds - characteristics and types. Software & Simulation Tools - MathLab Simulink, STATGRAPHICS, SPSS AMOS, LISREL, etc.

PREREQUISITES: Economics I and II, Finance I.

TEACHING METHODS: Lectures, using slides and presentations, case studies, solving tasks, team work and workshops, laboratory and course work, on-line and real-time market analyses, interactive on-line materials, manuals, etc.

METHOD OF ASSESSMENT: Current score (20%), preliminary test (20%), midterm test (20%), final test (20%) and Individual project (20%). Current score is comprised of: attendance/participation in the class, preparation of numerous assignments, quizzes, homeworks, workshops, etc.

INSTRUCTION LANGUAGE: English.

BIBLIOGRAPHY :

1. Bodie, Zvi, A. Kane, A. Marcus. Investments. 10th ed. IRWIN/McGraw-Hill, 2013;
2. Ilieva, R. E-Employment Ontology and Taxonomy. CHER-21, Vol.9, Heron Press, Sofia, 2011;
3. Ilieva, R. G-Cloud Services Performance Measurement. Proceedings of the ECS Research Conference'11, School of Electronics and Computer Science, University of Westminster, London, 2011;
4. Ilieva, R. Feasibility Study for Stratospheric GIS Aircraft Mission, International Virtual Journal Machines, Technologies, Materials", year VII, issue 3, Innovation in the Discrete Production Engineering, Publ. STUME, 2013;

OPTIONAL SUBJECTS LIST - 3

List 3 (MpIEe09 - ECTS 4)

MpIEe09.1 - Crosscultural Communication

MpIEe09.2 - Small Business Management and Entrepreneurship

Name of the course **Small Business Management and Entrepreneurship**	Code: **MpIEe09.2**	Semester: **4**
Type of teaching: Lectures and tutorials	Lessons per semester: L - 30 hours; T - 15 hours	Number of credits: **4**

LECTURER: **Assoc. Prof. PhD Valentina Alexsieva**
Technical University of Sofia, Branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Optional for the students specialty Industrial Engineering MEng programme of the Faculty of Electronics and Automation, FEA

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to acquaint students with the basic principles of starting and developing own high-technological business with potential for fast growth. The course is focused on the opportunities for development of small businesses and their consecutive transition to multinational companies. Part of the course is dedicated to business planning and the business plan as a key instrument for realisation of these goals. The business plan enables entrepreneurs evaluate financially the potential opportunities for their business and to attract capital.

DESCRIPTION OF THE COURSE: This course is focused on issues related to the management of small businesses and entrepreneurship. After completing the course students: will have general knowledge about the basic managerial principals most relevant to small business management; will know the nature and role of the entrepreneurship in market economy; will be able to develop business plans independently; will be able to analyze different case studies, relevant to entrepreneurship; will be able to evaluate potential business opportunities.

PREREQUISITES: Economics, Industrial Management, Production Management, Management of Human Resources, Management of Projects.

TEACHING METHODS: Lectures supported with power point presentations. Tutorials during which different case studies will be discussed and simulation games interpreting real situations will be done. Further each student will have to work independently on a business plan and defend it front of the lecturer and his colleagues.

METHOD OF ASSESSMENT: Written exam during the exam session (total 70%), development and defence of business plan (total 20%) and evaluation of the work during the tutorials (total 10%).

INSTRUCTION LANGUAGE: English

BIBLIOGRAPHY:

1. Bessant J., Tidd J., Innovation and Entrepreneurship, John Wiley and Sons, 2011;
2. Evers N., Cunningham J., Hoholm Th., Technology Entrepreneurship: Bringing Innovation to the Marketplace, The Palgrave Macmillan, 2014;
3. Gillin L., Burshtein S., Spinelli S., New Venture Creation: Entrepreneurship for the 21 Century: A Pacific Rim Perspective, McGraw-Hill Education, 2010;
4. Hatten T., Small Business Management: Entrepreneurship and Beyond, South-Western Cengage Learning, 2011;
5. Kuratko D.F., Entrepreneurship: Theory Process Practice - 9th Edition, South-Western Cengage Learning, 2013.

OPTIONAL SUBJECTS LIST - 4

List 4 (MpIEelO - ECTS 4)

MpIEelO.I - Microelectronic Technologies

MpIEe10.2 - Intelligent Manufacturing Systems

MpIEe10.3 - Product Development Using MSC Adams

MpIEe10.4 - Java Programming and Internet Application

DESCRIPTION OF THE COURSE

Name of the course **Microelectronic Technologies**	Code: **MpIEe10.1**	Semester: **4**
Type of teaching: Lectures and tutorials	Lessons per semester: L - 30 hours; T - 15 hours	Number of credits: **4**

LECTURER:

Assoc. Prof. Ph.D. Krassimir Denishev (FETT) - tel.: 965 3185, email: khd@tu-sofia.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Optional for the students, specialty Industrial Engineering, M.Sc. program of the English Language Faculty of Engineering (ELFE).

AIMS AND OBJECTIVES OF THE COURSE: To give a knowledge about technological processes and sequences, used in the contemporary microelectronics, principles of operation, parameters, design requirements and practical application of microelectronic devices and Microsystems, micromechanical devices and processes.

DESCRIPTION OF THE COURSE: The main groups of microelectronic devices are described, as well as the technological processes and sequences for their production. A special attention is paid to the contemporary Hybrid and Semiconductor Integrated Circuits and Devices. A comparatively analysis of the advantages and disadvantages of the different groups of devices, and of the tendencies of their production, are done. The main characteristic of Gallium Arsenide microelectronic devices and the corresponding technological processes are described. A special attention is paid to the contemporary Microsystems, their sensor and actuator parts. Some of the specific technological processes, the base of the Micromechanics and Microengineering, are described. This Course is a natural extension and development of the knowledge, received in the B.Sc. degree, during the course Manufacturing of Electronic Manufacturing (MEI).

PREREQUISITES: Physics, Chemistry, Mechanics, Electronics, Material Science, Fluid Mechanics, Manufacturing of Electronic Manufacturing (MEI), from B.Sc. degree of ELFE.

TEACHING METHODS: Lectures, using slides. The Laboratory works are performed by using of real technological equipment. Final test after each of the Laboratory works.

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

INSTRUCTION LANGUAGE: English

BIBLIOGRAPHY: 1. Denishev K., Technology of Micro Electro Mechanical Systems (MEMS), TU of Sofia, 2013. 2. Denishev K., M. Aleksandrova, G. Kolev, Technology of Micro Electro Mechanical Systems (MEMS) - Practical guide for laboratory works, TU of Sofia, 2013. 3. Chue Yoo San, Semiconductor Manufacturing Technology, W. Sc. Pub Co Inc., 2008. 4. Alex Hariz, Microelectronics : Design, Technology, And Packaging 2, Soc. of Ph. Opt., 2006. 5. May G. S., S. M. Sze, Fundamentals of Semiconductor Fabrication, J. W & Sons Inc., 2003. 6. Sze, S. M., Semiconductor Devices: Physics and Technology, J. W. & Sons Inc., 2001. 7. Madou, Marc J., Fundamentals of Microfabrication: the Science of Miniaturization, CRC Press, 2002. 8. Van Zant, Peter, Microchip Fabrication, McGraw Hill, May 2004. 9. Franssila, Sami, Introduction to Microfabrication, John Wiley & Sons Inc., February 2005. 10. Ladbrooke Peter H., MMIC Design: GaAs FETs and HEMTs, Artech House Inc. March 1989. 11. Middelhoek S., S. A. Audet, Physics of Silicon Sensors, Academic Press, 1989. 12. Nishi, Yoshio (Editor), R. Doering, Handbook of Semiconductor Manufacturing Technology, CRC Press, July 2007.

DESCRIPTION OF THE COURSE

Name of course **Intelligent Manufacturing**	Code: **MpIEe10.2**	Semester: **4**
Type of teaching: Lectures and tutorials	Lessons per week: L - 30 hours; T - 15 hours	Number of credits: **4**

LECTURERS: Prof. Michail Petrov, Ph.D. tel.: 032 959 585,e-mail: mpetrov@tu-plovdiv.bg,
Assoc. Prof. Albena Taneva, e-mail: altaneva@tu-plovdiv.bg
Technical University of Sofia, branch Plovdiv

COURSE STATUS IN THE CURRICULUM:

Optional for the students specialty Industrial Engineering MEng programme of the English Language Faculty of Engineering.

AIMS AND OBJECTIVES OF THE COURSE:

The aim of the course is to teach the mechanical engineering students the originating, development and application problems of artificial intelligence in manufacturing as well as to acquaint them with rational methods of applying different techniques for the establishment of manufacturing systems.

DESCRIPTION OF THE COURSE:

The course contains: current problems of the implementation of artificial intelligence in manufacturing procedures; creation of knowledge systems in the fields of mechanical engineering, and other manufacturing areas; elements of adaptive and production control systems; application of the artificial neural networks, intelligent agents, and fuzzy logic.

PREREQUISITES:

Basic knowledge in the fields of regulation and control devices, and control systems for automated complexes obtained in the B.Sc. and M.Sc. degree course.

TEACHING METHODS:

The course will be taught as a mixture of lectures (incl. visual aids and www-sources), seminars work and tutorials based on the lectures; presentation of an individually prepared report.

METHODS OF ASSESSMENT:

Written test at the end of the 2nd semester and consideration of the written theses and seminars work results.

INSTRUCTION LANGUAGE: English

BIBLOGRAPHY: 1. Groover, M., E. Zimmers, CAD/CAM Computer Aided Design and Manufacturing, Prentice Hall International Inc., 2010; 2. Mitchell., F., CIM Systems. An Introduction to Computer Integrated Manufacturing, Prentice Hall International Inc., 1991;

3. Shah, J., M. Mantyla. Parametric and feature Based CAD/CAM. John Wiley and Sons Inc., 1996; 4. Groover, M., Automation, Production Systems and CIM, Prentice Hall International Inc/., 2011; 5. Neshkov**,** T.Introduction to specialty MECHATRONIC SYSTEMS, HERON PRESS, Sofia,2013; 6. Bosevska, A., T.Neshkov**,** Intelligent Manufacturing systems, HERON PRESS, Sofia, 2014; 7. Krafter, R., T. Cheniewski, M. Negiu. Robotic Engineering, Prentice Hall International Inc., 1989; 8. Jackson, P., Introduction to Expert Systems. Addison Wesley, 1990

DESCRIPTION OF THE COURSE

Name of the course **Product Development**	Code: **MpIEe10.3**	Semester: **4**
Type of teaching: Lectures and tutorials	Lessons per semester: L - **30** hours, T - **15** hours	Number of credits: **4**

LECTURER:

Assoc. Prof. Nikolay Kakanakov Ph.D. tel. 032 959 725; e-mail: kakanak@tu-plovdiv.bg;

Technical University – Sofia, branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Optional for the students specialty Industrial Engineering, M.Sc. program of the English Language Faculty of Engineering (ELFE).

AIMS AND OBJECTIVES OF THE COURSE: Its main aim is to accomplish the transition from general scientific to design and technological knowledge and give the students the necessary knowledge about the nature of the mechanical systems and their building. ADAMS is a powerful modelling and simulation environment. It enables students to design, visualize, and improve his mechanical system model prior to building a physical prototype. Using ADAMS, students can submit simulations to ADAMS/Solver to compute the force and motion behavior of your system and to write that information to output files. The subject increases the engineering and technical culture of the students and helps for developing of the creative and inventor thinking at designing and improving of various technical means.

DESCRIPTION OF THE COURSE: The MSc Mechanical Engineering course has been designed to reflect the increasing industrial use of complex analytical tools such as Adams Mechanisms, Finite Element Analysis and Solid Modelling techniques. Adams is the most widely used multibody dynamics and motion analysis software in the world. Adams helps engineers to study the dynamics of moving parts, how loads and forces are distributed throughout mechanical systems, and to improve and optimize the performance of their products. Adams multibody dynamics software enables engineers to easily create and test virtual prototypes of mechanical systems in a fraction of the time and cost required for physical build and test. Unlike most CAD embedded tools, Adams incorporates real physics by simultaneously solving equations for kinematics, statics, quasi-statics, and dynamics. Utilizing multibody dynamics solution technology, Adams also runs nonlinear dynamics in a tiny fraction of the time required by FEA solutions. Loads and forces computed by Adams simulations improve the accuracy of FEA by providing better assessment of how they vary throughout a full range of motion and operating environments. The subject matter ranges over the problems of structural, geometrical, kinematical, force analysis and dynamical analysis and synthesis of the mechanisms and machines.

PREREQUISITES: Necessary knowledge of Mathematics (Linear algebra, Analytical Geometry, ODE, Linear differential equations), Physics, Theoretical Mechanics, Theory of Mechanisms and Machines, AutoCAD.

TEACHING METHODS: Visual aids, devices and operating models of mechanisms are using for lectures. The seminars are held in accordance with the curriculum specialized in computer class equipped with a legal copy of the program MSC ADAMS.

METHOD OF ASSESSMENT: Written test at the end of the 2-nd semester.

INSTRUCTIONAL LANGUAGE: English

BIBLIOGRAPHY:

1. Support systems: MSC ADAMS®, SolidWorks®, Autocad®, Pro/Engineer®;
2. Russell C. Hibbeler,Russell C Hibbeler, Engineering Mechanics: Dynamics (9th Edition), December 22, 1997;
3. Murilo G. Coutinho, Dynamic Simulations of Multibody Systems, Jul 1, 2001;
4. Arthur G. Erdman, George N. Sandor, Mechanism Design: Analysis and Synthesis (4th Edition), May 15, 2001;
5. Garabitov Stefan, Product Development using MSC Adams, TU Sofia, Jan, 2012.

DESCRIPTION OF THE COURSE

Name of the course: **Fundamentals of design and construction**	Code: **MpIEell**	Semester: **4**
Type of teaching: Lectures, Tutorials, Course project	Lessons per semester: L - 15 hours; T - 30 hours; CP - 2,1 hours/student	Number of credits: **3**

LECTURER:

Assoc. Prof. Dr. Margarita Deneva, tel.: 9032 659 739, email: deneca@tu-plovdiv.bg

Technical University of Sofia, Branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Compulsory for the students specialty Industrial Engineering MEng programme of the Faculty of Electronics and Automation, FEA.

AIMS AND OBJECTIVES OF THE COURSE: To give knowledge about the principles and the essence of the engineering design. Based on the systematic approach to the design, planning and organization design methods, role of real engineering calculations and assessment procedures are discussed.

DESCRIPTION OF THE COURSE: The main topics concern: Introduction to the engineering design, types of engineering projects, main goals and tasks of the design, basic input considerations; Main stages of the engineering design project - preliminary analysis, solution versions, comparison and assessments; Planning methods and organization of the entire project process - The Gant charts, PERT approach, network planning; Economic factors as part of the whole design process - fixed and variable cost components of the project; Development and investigation of the models as part of the engineering project, computer aided approach and technologies; Documentation of the engineering project - main requirements at the preliminary and final project stages; Analysis of some real engineering project examples.

PREREQUISITES: Physics, Electrical Engineering I, Electrical Engineering II, Computing, Material Science, applied Geometry and Engineering Graphics.

TEACHING METHODS: Lectures, using slides, case studies, tutorials and course project of a real electric board for a.c. motor starting unit, course project description preparation and defense. Available copies of the lectures, visualization of the tutorials with real components for the design project preparation, copies of all necessary materials for the design project preparation.

METHOD OF ASSESSMENT: Individual work during the semester (10%), plus log book (20%), plus project written report (50%), plus viva presentation (20%).

INSTRUCTIONAL LANGUAGE: English.

BIBLIOGRAPHY:

1. B. Hawkes, R. Abinett, The Engineering Design Process, Longman, London, 1990; 2. J. Corbett, M. Dooner, J. Meleka, C. Pym, Design for Manufacture Strategies, Principles and Techniques, Addison-Wesley Publishing Ltd., 1991; 3. B. Wu, Manufacturing Systems Design and Analysis, Chapman & Hall, London, 1992; 4. J. Harpool, R. Culp, R. Galehouse, Systems Analysis and Design Projects, Times Mirror/Mosby College Publishing, ST. louis, 1987.

DESCRIPTION OF THE COURSE

Name of the course: **Diploma Project**	Code: **MpIEel3**	Semester**: 3,4**
	Hours per semester: 1st Semester 240 2nd Semester 210	Number of credits: **15**