Course Descriptions for the Joint Study Programme
"International Master of Science in Engineering, Entrepreneurship and Resources (MSc. ENTER)

Version 09.2019

Courses at **University of Sarajevo**
with the Specialization "**Industrial Engineering and Management**"

Module Name	**Project Management**
Code	IIM-06
ECTS Credits	5
Responsible	Prof. dr. Mugdim Pašić
Lecturer(s)	Prof. dr. Mugdim Pašić
Duration	Winter semester
Teaching Language	Bosnian/English
Learning Outcome (Competencies)	The main goal of the course is to understand concept and methods of the project management, project planning and control, project implementation and monitoring as well as justification and evaluation of a project.
Contents	Project as lateral organizational linkage – dynamic aspect of organizational structure and relation to static aspect. Project and matrix organization - way of functioning of a matrix organization. Team and team work as basis for the realization of the project (project team) and the role of the project manager. Defining the project. Project planning and resources planning. Budgeting and justification of the project. Implementation and monitoring of implementation of the project. Closing and documenting of the project. Evaluation of the project success. Systems of the project quality assurance.
Teaching Methods	Lectures: 2; Exercise: 2
Materials/literature	1. Meredith, J. R.; Mantel, S. J.; Shafer, S. M., (2017), "Project Management in Practice", John Wiley & Sons, Inc., NJ, USA. 2. Larson E. W.; Gray C. F., (2018), "Project Management: The Managerial Process", Irwin McGraw-Hill, NY, USA. 3. Kerzner H., (2017), "Project Management – A Systems Approach to Planning, Scheduling and Controlling", John Wiley & Sons, Inc. NJ, USA. 4. Chatfiled C.; Johnson T., (2016), "Microsoft Project 2016 - Step by Step", Microsoft Press International, Redmond, Washington, USA.

Module Name	**Industrial Logistics**
Code	IIM-19
ECTS Credits	5
Responsible	Ass. Prof. dr. Hadis Bajrić
Lecturer(s)	Ass. Prof. dr. Hadis Bajrić

Duration	Winter semester
Teaching Language	Bosnian/English
Learning Outcome (Competencies)	Students will get familiar with the nature and functional areas of logistic systems, as well as to understand the role of logistics in building competitive advantage by increasing the efficiency of the process and overall business operations in industrial enterprises.
Contents	Definition of Logistics. Historical development of logistics. Logistics activities and concepts. Relationship between logistics and other functions in companies. Business Logistics. Supply chain management. Information Technology and Supply Chain Management. Inventory control, Warehouse Management. Transportation Systems. Order Fulfillment. Organizational Aspects of Logistics.
Teaching Methods	Lectures: 2; Exercise: 2
Materials/literature	1. Bloomberg, J.D.; Le Maj, S.; Hanna B.J., (2006), „Logistika“, Mate,Zagreb, Croatia 2. Waters, D., 2003. Logistics: An Introduction to Supply Chain Management, Palgrave Macmillan, New York, USA 3. Hiller, S.F.; Lieberman, J. G., (2005), “Introduction to Operations Research”, Mcgraw Hill, Boston, USA

Module Name	**Intelligent Industrial Systems**
Code	IIM-53
ECTS Credits	5
Responsible	Ass. Prof. dr. Edin Kadrić
Lecturer(s)	Ass. Prof. dr. Edin Kadrić
Duration	Winter semester
Teaching Language	Bosnian/English
Learning Outcome (Competencies)	Introducing students with basic concepts of artificial intelligence and machine learning and training for the analysis and design of intelligent industrial systems
Contents	Data collection and data mining. Clastering. Artificial intelligence. Artificial neural networks. Artificial neural networks structure for system modelling and control. Genetic algorithms. Machine learning. Algorithm Evaluation.
Teaching Methods	Lectures: 2; Exercise: 2
Materials/literature	1. Giudici, P.; Figini, S., (2009), Applied Data Mining for Business and Industry. Chichester: John Wiley & Sons. 2. Negnevitsky, M., (2011), Artificial Intelligence: A Guide to Intelligent Systems. 3rd ed. Esex: Pearson Education Limited. 3. Alpaydin, E., (2014), Introduction to Machine Learning. 3rd ed. Cambridge: The MIT Press.

Module Name	**CAM (Computer Aided Manufacturing)**

Code	MPI-48
ECTS Credits	5
Responsible	Prof. dr. Maida Čohodar-Husić
Lecturer(s)	Prof. dr. Maida Čohodar-Husić
Duration	Winter semester
Teaching Language	Bosnian/English
Learning Outcome (Competencies)	To provide understanding of modern trends in manufacturing using CNC machine and industrial robots. The students will get familiar with automated generated NC program based on integration of CAD/CAM and offline robot programming.
Contents	Introduction. Brief history of CNC systems and industrial robots. NC machines, CNC machines, CNC control system (Motion controller, Interpolation, incremental Absolute system, DNC machines, Part programming, CAM Software, CAD/CAM integration, Case studies. Robot programming: On line and Off line programming, software for off line robot programming, Case studies. Automated Guided Vehicles (AGV), Programming of AGV. Automated Production Lines, Assembly systems and Line Balancing, Automated Material Handling. Automated inspection procedure. Role of Mechatronics in Manufacturing, Elements, procedure, benefits and applications.
Teaching Methods	Lectures: 2; Exercise: 2
Materials/literature	1. Tien-Chien C.; Richard A. Wysk; Hsu-Pin W., (2005), "Computer-Aided Manufacturing", Prentice Hall International Series on Industrial and Systems Engineering. 2. Groover, M. P., (2016), „Automation, Production System and Computer Integrated Manufacturing", Global Edition, Pearson Education Limited. 3. Zeid I., (2009), "CAD/CAM theory and practices", McGraw Hill International Edition. 4. Robot Studio manual 5. CATIA manual

Module Name	**Ergonomics and Biomechanics**
Code	IIM-09
ECTS Credits	5
Responsible	Prof. dr. Fikret Veljović
Lecturer(s)	Prof. dr. Fikret Veljović
Duration	Winter semester
Teaching Language	Bosnian/English
Learning Outcome (Competencies)	The main goal of this course is mastering the laws of ergonomics design, work safety, and the organization of work.
Contents	Introduction. Development of ergonomics, relationship of ergonomics-ecology, ergonomics in construction and design, ergonomics and work science, work safety. Mathematical statistics. Application of the theory of probability and mathematical statistics in design. Anthropometry. Anthropometric variables in construction and design. Physiology. Design of work in function of energy, metabolism, work classification, workload, temperature, noise, vibrations and lighting. Psychology. Psychic loads, information and communication. Ergonomic

	principles. Principles in job creation, machine tools, tools, work, time, material and tool handling, environmental design, ergonomic standards, product ergonomic analysis. Organization of work. The connection between the organization of work and ergonomics. Biomechanics of the locomotor system of human. Structural scheme of the human skeleton as a kinematic chain, with the basics of system dynamics. Human walking, measuring kinematic and dynamic traits in walking. Reference standing, sitting and lying human position. Measuring and determining the center of the masses of human. Biomechanics of bone tissue of man. Physical properties of the bones. Biomechanics of soft tissue. Biomechanics of the circulatory system. Prosthetic technique. Prostheses of arms and legs, prostheses of the joints
Teaching Methods	Lectures: 2; Exercise: 2
Materials/literature	1. Marrell, K. F. H., (1979), ”Ergonomics: Man in His Working Environment”, Chapman and Hall, London, 1979. 2. Grandjean, E., (1980), ”Fitting the Task to the Man”, Taylor and Francis Ltd. 3. Muftić, O.; Rudan, P.; Taboršak, D., (1983), ”Ergonomija”, Zbor liječnika Hrvatske, Zagreb. 4. Muftić, O.; Veljović, F.; Jurčević, T., Milčić, D., (2001), ”Osnovi ergonomije”, Sarajevo.

Elective modules

Module Name	**Finite Element Method in Mechanical Engineering**
Code	IIM-46
ECTS Credits	5
Responsible	Prof. dr. Izet Bijelonja
Lecturer(s)	Prof. dr. Izet Bijelonja
Duration	Winter semester
Teaching Language	Bosnian/English
Learning Outcome (Competencies)	Understand the underlying mathematical basis behind finite element approach; Apply fundamental finite element analysis techniques to solve simple engineering problems; Plan and execute appropriate finite element analyses to solve solid mechanics problems; Apply commercially available FE softwares to solve real world engineering problems.
Contents	Introduction to FEA and numerical discretization concept; Mathematical models in solid mechanics; FEA as a part of Computer-Aided Engineering; Stiffness matrices for bars and trusses; Stiffness matrices for beams and frames; Element library for bar and beam FE; Formulation of the FEM for linear analysis in solid mechanics; Formulation of the Displacement-Based FEM; Stiffness matrices for2D and 3D FE; Plate and Shell FE; Formulation and calculation of isoparametric finite element matrices; Higher order elements, Element library of isopatrametric FE; FE problem solving approach using a software solution; FE softwares architecture; Modelling assumptions; Imposition of boundary conditions; Meshing strategy; Solution convergence and validation; Sources of error and assessment of error; FE results analyses;

	FE modeling of complex mechanical structures;
Teaching Methods	Lectures: 2; Exercise: 2
Materials/literature	1. Bathe K.-J., (2014), ”Finite Element Procedures”, Prentice-Hall, (http://web.mit.edu/kjb/www/Books/FEP_2nd_Edition_4th_Printing.pdf 2. Zienkiewicz O. C.; Taylor R. L.; Zhu J. Z., (2013), “The Finite Element Method”, Elsevier.

Module Name	**Flexible Manufacturing Systems**
Code	MPI-27
ECTS Credits	5
Responsible	Assoc. Prof. dr. Đerzija Begić-Hajdarević
Lecturer(s)	Assoc. Prof. dr. Đerzija Begić-Hajdarević
Duration	Winter semester
Teaching Language	Bosnian/English
Learning Outcome (Competencies)	The student will get familiar with the role of flexible manufacturing systems in manufacturing, the concept of group technology and cellular manufacturing, and the benefits of automation.
Contents	Most important ingredients are: flexible manufacturing system (FMS)– overview; production systems, group technology and cellular manufacturing; classification and coding system; basic components of FMS: workstations, automated material handling and storage system and computer control system; types of FMS, applications and benefits of FMS; planning and implementation issues of FMS and quantitative analysis of FMS.
Teaching Methods	Lectures: 2; Exercise: 1; Laboratory exercise: 1
Materials/literature	1. Groover, M.P., (2007), “Automation, Production Systems, and Computer-Integrated Manufacturing”, Pearson, New Jersey, USA. 2. Shivanand, H.K.; Benal, M.M.; Koti, V.; (2006), “Flexible Manufacturing Systems”, New age International Publishers, NewDelhi, India.

Module Name	**Expert Systems and Knowledge Bases**
Code	RIM-29
ECTS Credits	5
Responsible	Prof. dr. Senad Burak
Lecturer(s)	Prof. dr. Senad Burak
Duration	Winter semester
Teaching Language	Bosnian/English
Learning Outcome (Competencies)	The aim of this course is to introduce expert systems and knowledge bases, technology that is the current trend, but also the future of information technology development. Systems based on knowledge based applications, as well as those based on artificial intelligence, are today a reality in many disciplines of science, engineering and in particular defense technologies.
Contents	Introduction to Expert Systems. Basic concepts of expert systems and knowledge base. Application of expert systems. Trends in the development of expert systems and systems based on knowledge bases. Advantages and problems in introducing expert systems. Directions for future development and anticipated expectations.

Teaching Methods	Lectures: 2; Exercise: 2
Materials/literature	1. Rattz J. C., (2008), ”Pro LINQ Language Integrated Query in C# 2008”, Apress. 2. Silberschatz, A; Korth, H. F.; Sudarshan, S., (2013), ”Database System Concepts”, McGrawHill. 3. Gunderloy, M.; Jorden J. L., (2001), ” Mastering SQL Server 2000”, Sybex. 4. Luger, G. F., (2009), ”Artificial Intelligence: Structures and Strategies for Complex Problem Solving”, Pearson (Addison-Wesley). 5. Hancock, J. C.; Toren, R., (2007), ”Practical Business Intelligence With SQL Server 2005”, Pearson (Addison-Wesley).