UNIVERSITETI /UNIVERSITY
"ISA BOLETINI"
MITROVICË

Course Curriculum Model (Syllabus)		
Faculty:	**FACULTY OF MECHANICAL AND COMPUTER ENGINEERING**	
Department:	Mechanical Engineering	
Level:	Bachelor	
Code of the course:	308 ME	
Course:	**SHEET METAL DESIGN&TOOLING**	
Course Status:	Mandatory	**Mandatory**/Elective
Semester:	(VI)	Winter/**Summer**
Number of hours per week:	2+2	
ECTS:	5	
Time / location:	Wednesday, 9^{00}-10^{30}, K5	
Year of studies:	2024/2025	
Lecturer:	Prof. Ass. Dr. Fitim ZEQIRI	
Assistant:		
Contact details:	Professor	Assistant
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Telephone:		

Course description	This course provides a comprehensive exploration of sheet metal design and manufacturing processes. Participants will gain an understanding of sheet metal properties, manufacturing techniques, and considerations for designing sheet metal parts. Practical skills in CAD software will be developed for bending, forming, cutting, piercing, and joining operations. Advanced topics such as tooling design and multistage forming will be covered. The course includes hands-on project work, allowing participants to apply their knowledge in the iterative design, prototyping, and tooling phases, culminating in a final project presentation.
Purpose (Goals)	The course aims to produce participants with a comprehensive skill set, blending theoretical knowledge with practical application, making them proficient in sheet metal design and manufacturing processes. Participants will be prepared to tackle challenges in the industry and contribute effectively to the design and production of sheet metal components.

Learning outcomes	Upon completion of the course on SHEET METAL DESIGN&TOOLING, students should be able to: 1. Sheet Metal Fundamentals: ● Gain a foundational understanding of sheet metal properties, manufacturing processes, and design considerations. 2. CAD Proficiency: ● Develop proficiency in using CAD software for sheet metal design, covering bending, forming, cutting, and joining operations. 3. Practical Application Skills: ● Apply theoretical knowledge in real-world scenarios through hands-on project work, including iterative design, prototyping, and tooling. 4. Advanced Design Techniques: ● Explore advanced sheet metal design techniques, such as multistage forming, manufacturability optimization, and quality control. 5. Industry-Ready Competence: ● Acquire skills relevant to industry demands, including problem-solving, feasibility analysis, prototyping, tooling design, and effective project presentation.

	Weeks	Lecture
Program (content)	***First week:***	Introduction to Sheet Metal Design ● Understanding sheet metal as a material and its properties ● Sheet metal manufacturing processes ● Design considerations for sheet metal parts ● Introduction to CAD software for sheet metal design (e.g. SolidWorks, Inventor, Fusion 360)
	Second week:	Sheet Metal Bending and Forming ● Basic principles of sheet metal bending ● Types of bends and their characteristics ● Bending and forming tools and equipment ● Designing for bending and forming operations using CAD software
	***Third week*:**	Sheet Metal Cutting and Piercing ● Cutting methods for sheet metal ● Punching and piercing operations ● Types of cutting and piercing tools ● Designing for cutting and piercing operations using CAD software
	Fourth week:	Sheet Metal Joining ● Welding, riveting, and fastening methods for sheet metal ● Joint design and strength considerations ● Selection of joining methods based on application requirements ● Designing for joining operations using CAD software
	Fifth week:	Sheet Metal Tooling Design ● Design of dies and punches for sheet metal forming and cutting operations ● Selection of tooling materials and heat treatment ● Tooling maintenance and troubleshooting ● Using CAD software for tooling design
	***Sixth week*:**	Advanced Sheet Metal Design Techniques ● Multistage forming operations ● Design for manufacturability and cost optimization ● Designing for assembly and installation ● Sheet metal part inspection and quality control ● Applying CAD software for advanced design techniques

	Seventh week:	CAD Software for Sheet Metal Design ● Detailed instruction on using specific CAD software for sheet metal design ● Hands-on practice exercises to reinforce skills learned
	Eighth week:	CAD Software for Sheet Metal Design ● Detailed instruction on using specific CAD software for sheet metal design Hands-on practice exercises to reinforce skills learned
	Ninth week:	Project Work - Design and Analysis ● Working on a sheet metal design project using CAD software ● Analysing design and manufacturing feasibility ● Iterative design process to refine the design
	Tenth week:	Project Work - Design and Analysis ● Working on a sheet metal design project using CAD software ● Analysing design and manufacturing feasibility Iterative design process to refine the design
	Eleventh week:	Project Work - Prototyping and Testing ● Building a physical prototype of the sheet metal part ● Testing the prototype to ensure it meets design and functional requirements
	Twelfth week:	Project Work - Prototyping and Testing ● Building a physical prototype of the sheet metal part ● Testing the prototype to ensure it meets design and functional requirements
	Thirteenth week:	Project Work - Tooling Design and Manufacturing ● Designing and building tooling for the sheet metal part using CAD software ● Tooling manufacturing and troubleshooting ● Testing the tooling and making adjustments as needed
	Fourteenth week:	Project Work - Tooling Design and Manufacturing ● Designing and building tooling for the sheet metal part using CAD software ● Tooling manufacturing and troubleshooting ● Testing the tooling and making adjustments as needed
	Fifteenth week :	Project Work and Presentations

Literature	
L **i** **t** **e** **r** **a** **t** **u** **r** **e**	**Sheet Metal Forming Processes and Die Design**; by Vukota Boljanovic and J. R. Crawford **Sheet Metal Design: Basic Principles and Calculations**; by Hassan Abdel-Gawad El-Hofy **Sheet Metal Forming: Processes and Applications**; by Taylan Altan, Erman Tekkaya, and ASMInternational **Sheet Metal Handbook**: How to Form and Shape Sheet Metal for Competition, Custom and Restoration Use; by Ron Fournier **Sheet Metal Design Using Autodesk Inventor**; by Travis Jones **Sheet Metal Design with SolidWorks**; by Joe Bucalo **Sheet Metal Design: Beyond Bends and Flanges**; by Kuang-Hua Chang **Sheet Metal Design: Autodesk Inventor 2019**; by Tutorial Books

Teaching methodology

The teaching methodology for the SHEET METAL DESIGN&TOOLING course may involve a combination of the following:

- Lectures: In-class lectures can be used to introduce new concepts and techniques, as well as to provide an overview of the course material.
- Hands-on exercises: Students can be provided with hands-on exercises to practice using the software and tools covered in the course. These exercises can be done individually or in groups, depending on the class size and available resources.
- Case studies: Case studies can be used to illustrate real-world applications of SHEET METAL DESIGN&TOOLING techniques in various industries, such as aerospace, automotive, and consumer products.
- Guest lectures: Inviting guest speakers from industry or academia can provide students with additional perspectives on the applications and challenges of SHEET METAL DESIGN&TOOLING in various fields.
- Projects: Assigning projects to students can help them apply the concepts and techniques covered in the course to real-world problems. These projects can be done individually or in groups and can be tailored to the interests and skills of the students.
- Discussions and critiques: Engaging students in class discussions and critiques can help them develop their communication and critical thinking skills, as well as provide valuable feedback on their work.

Contribution to student workload (which should correspond to student learning outcomes - 1 ECTS credit = 25 hours)

Activity	Hours	Days/weeks	Total
Lectures	2	15	30
Exercise sessions (with TA)	2	15	30
Practical work	3	3	9
Office hours	1	15	15
Fieldwork	1	2	2
Midterms, seminars	2	2	4
Homework	3	2	6
Self-study	4	3	12
Final exam preparation	3	3	9
Time spent in exams	2	2	4
Projects, presentations, etc.	2	2	4
Total			**125**

Evaluation

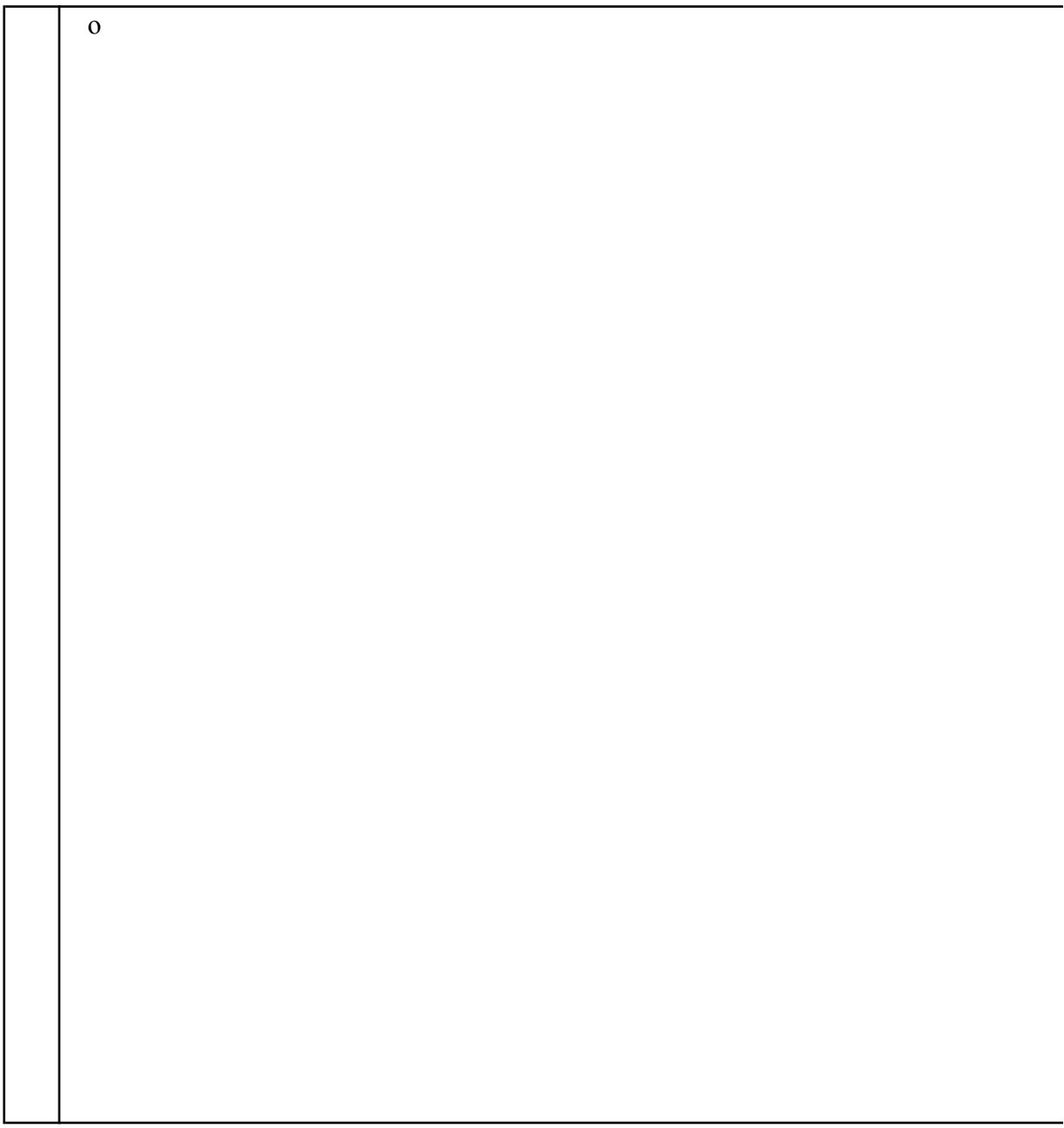
Assessment methodology:

- Homework assignments: Students can be given regular homework assignments to practice using the SHEET METAL DESIGN&TOOLING software and to reinforce the concepts taught in class.
- Design projects: Students can be assigned design projects that require them to apply the SHEET METAL DESIGN&TOOLING skills and knowledge learned in class. This can be done individually or in teams.
- Quizzes and exams: Short quizzes or exams can be given periodically to test students' understanding of the material covered in class.
- Presentations: Students can be asked to give presentations on a topic related to SHEET METAL DESIGN&TOOLING. This can help them develop their communication skills and deepen their understanding of the subject matter.
- Lab assignments: Students can be given lab assignments that require them to use the SHEET METAL DESIGN&TOOLING software to design and manufacture physical parts or prototypes.
- Class participation: Students can be assessed based on their active participation in class discussions, group work, and other class activities.
- Final project: Students can be asked to complete a final project that demonstrates their mastery of the SHEET METAL DESIGN&TOOLING skills and knowledge acquired throughout the course. The project can be a design project or a manufacturing project, and can be done individually or in teams.

(according to the Statute and Regulation for studies of UMIB)

Tests / Colloquia (First Test) (Second test)	15% 15%
Practical test during exercises (Essay)	
Workshop seminar	
Interpretation and presentation of artistic creativity and other works.	
Assignments and courses during the semester	15%
Professional practice	
Other,(Specify) Participation	10%
Final exam	45%
Total	100%
Final grade	Points (%) Mark
	91 – 100 10
	81 - 90 9
	71 - 80 8
	61 - 70 7
	51 - 60 6

Academic policies	**Criteria for regular attendance and rules of etiquette during the organization of the lesson are set.** **Computer work:** Graphic works, I have to draw and write with a computer. In the works it is obligatory to respect the criteria for both the visual and the content aspect of the required works. **Ethics in teaching:** Graphic works should be personal works of each student. There will be no tolerance for copying, "borrowing" from the Internet or any other material. The same or similar works will have negative evaluations in the final evaluation of the student. **Time:** In agreement with the students, the deadlines for submitting works will be determined. There will be no tolerance for delays in the submission of works. Failure to arrive at the time when the assignment is explained does not justify the student for not submitting the paper. The deadline will be given earlier. If you are going to travel abroad, then you need to submit the paperwork in advance. The student has the right to request a consultation with the professor whenever he / she deems it reasonable and necessary for the performance of his / her work. **Rules of conduct and academic policies:** ● active participation of students in lectures o participation in discussion, comments and free expression of opinion, opinion and academic position (with arguments) ● Mandatory independent work and use of additional sources of information (various scientific websites, scientific journals, conference proceedings, etc.) ● Respecting lecture schedules without compromising academic freedom (silent cell phones) of respecting the word, thoughts and ideas of colleagues, ● It is not allowed to arrive late and leave without a valid reason from the lecture, test or exam o preparation and holding of relevant lectures, (obligation of the teacher). ● if the student is absent more than four times without reason in lectures and exercises, does not receive the signature for attendance. o the student cannot take the exam without an official document, ● if the student is dissatisfied with the grade obtained, has the right to complain in writing to the dean, within two working days after the announcement of the results, UMIB Statute o if the student does not follow the rules, in the exam uses tools that are not allowed, it is evaluated with a negative grade.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Mitrovica; 29/04/2023 Prof. Ass. Dr. Fitim Zeqiri