COURSE SYLLABUS

University	UNIVERSITY OF ORADEA
Faculty	FACULTY OF ENERGY ENGINEERING AND INDUSTRIAL MANAGEMENT
Study program*	*INDUSTRIAL ECONOMICS ENGINEERING*

I. Course Name: Linear algebra and analytic and differential geometry

II. Course Details

No of hours/week						
Code	Semester	Credits	Lecture	Seminar	Laboratory	Project
IEMI 0332	1		2	1		

III. Course coordinator (title, name, surname, e-mail): lecturer Borsa Emilia Rodica borsa_emilia@yahoo.com

IV. Course objectives

1. Problem Solving and Technical Calculations specific to Industrial Engineering and Management.

- **Engineering Logic:** Applying mathematical formulas to determine material strength, logistical flows, or production costs.
- **Demonstrations:** Logically validating proposed solutions to ensure the safety and efficiency of industrial processes.
- **Practical Application:** Turning abstract physics and math concepts into actionable engineering solutions (e.g., optimizing an assembly line).

2. Linear Algebra

In an engineering context, linear algebra is the foundation for managing complex systems:

- **System Modeling:** Using matrices to represent and solve systems with multiple variables.
- **Linear Programming:** Essential for **resource optimization** in management (minimizing costs while maximizing output).
- **Kinematics:** Used in industrial robotics to calculate the movement and positioning of mechanical arms in space.

3. Analytical and Differential Geometry

- **Analytical Geometry:** The basis of **Computer-Aided Design (CAD)**, used to define the exact coordinates and intersections of machine components.
- **Differential Geometry:** Applied to the study of complex surfaces (e.g., aerodynamics of a vehicle or turbine blade design) and analyzing how shapes deform under thermal or mechanical stress.

V. Course content	**No. of hours**
V.1. Lecture (chapters/subchapters and paragraphs)	
Matrices and linear systems	4
Vector spaces	2
Bases and dimension of vector spaces	4
Linear applications	2
Free vectors	4
Coordinate systems in plane and space. Line and plane.	6
Conic circle, ellipse, hyperbola, parabola	4

Cuadros, sphere, tangent and normal	2
V.2. Laboratory/Seminar/Project: The same topic as in courses	

VI. Bibliography

1. Borsa, E., -Matematici aplicate, Editura Universitătii Oradea, 2003
2. Borsa, E., -Matematici superioare, Editura Universitătii Oradea, 2004
3. Chirita S.,-Probleme de matematici superioare, Editura Didactica si Pedagogica Bucureşti, 1989
4. Gheorghiev Gh., Miron R., Papuc D., Geometrie analitică si diferentială, Editura Didactică si Pedagogică , Bucureşti, 1968
5. Radu C., Algebră liniară, geometrie analitică si diferentială, Editura All, Bucuresti, 1996

VII. Grading criteria

Activities	Assesment	% of final grade
Exam	Written exam: 1. Requirements in order to get the minimum grade for passing the exam 2. Requirements for the maximum grade	80%
Seminar/Laboratory/Project	Homework to do	20%

VIII. Learning outcomes:

Problem-solving, performing calculations and proofs, and applying theoretical concepts to resolve specific challenges in industrial engineering and management. The ability to utilize theoretical principles of linear algebra, as well as analytical and differential geometry, in various practical engineering applications

Course coordinator,
Lecturer Emilia Borsa

**Se va completa cu unul din programele de studii de licență sau master gestionat de:*

- ***DIEn: APPLIED INFORMATICS IN POWER ENGINEERING, POWER SYSTEMS ENGINEERING, ENERGY ENGINEERING FOR INDUSTRY, RENEWABLE ENERGY SYSTEMS ENGINEERING, RENEWABLE ENERGY, ENERGY SYSTEMS MANAGEMENT SYSTEMS ENGINEERING***
- ***DTMPI: KNITTING AND CLOTHING TECHNOLOGY, INDUSTRIAL ECONOMICS ENGINEERING, QUALITY MANAGEMENT AND CONSUMER'S PROTECTION IN THE FIELD OF TEXTILES AND LEATHER***