



UNDERGRADUATE COURSE IN AGRICULTURAL ENGINEERING
Lesson development plan
1st semester of 2024



Fls. 1

Discipline code: **FA115**

Class: **A**

Discipline name: **INTRODUCTION TO THE FINITE ELEMENT METHOD**

TABLE A – DISCIPLINE VECTORS

Number of Course Credits: 2	Total Hours of Theoretical Activities: 15 Total Hours of Practical Activities: 0 Total Lab Hours: 15
-----------------------------	--

TABLE B - DISTRIBUTION OF THE DIDACTIC LOAD CONSIDERING THE VECTOR OF THE DISCIPLINE		TOTAL IN HOURS			
		The total number of hours should be calculated considering the specific vectors of the discipline			
Type of Participation	Name of Faculty Member	THEORETICAL	&	PRACTICE	Total (hours)
Coordinator	WILLIAM MARTINS VICENTE	15		15	30

SYLLABUS:

Review of solid mechanics. Bar and truss elements. Elements of beams and frames. Two-dimensional elements. Three-dimensional elements. Introduction to ANSYS software. Modeling and solution techniques.

SCHEDULE:

DATES	LESSON	LECTURE
01/02	1 – Presentation of the course Uniaxial Bar Elements: Direct Method	William M. Vicente
08/03	There will be no class	
15/03	2 – Trusses: direct method	William M. Vicente
22/03	3 – Weighted residual method	William M. Vicente
29/03	There will be no class	
05/04	4 – Energy Methods	William M. Vicente
12/04	5 – Triangular element of constant deformation	William M. Vicente
19/04	6 – Rectangular element with four nodes	William M. Vicente
26/04	7 – Isoparametric quadrilateral element	William M. Vicente
03/05	8 – Numerical Integration – N1	William M. Vicente
10/05	9 – Introduction to ANSYS software	William M. Vicente
17/05	10 – Creation of geometries	William M. Vicente
24/05	11 – Meshing	William M. Vicente
31/05	There will be no class	
07/06	12 – Creation of 2D computer models	William M. Vicente
14/06	13 – Creation of 3D computer models	William M. Vicente
21/06	14 – Static structural analysis	William M. Vicente
28/06	15 – Presentation of the project – N2	William M. Vicente
05/07	There will be no class	
12/07	Final exam	William M. Vicente

BIBLIOGRAPHY:

Main References

- Nam-Ho Kim e Bhavani V. Sankar, Introdução à Análise e ao Projeto em Elementos Finitos, LTC, 2011.
- Marco Lúcio Bittencourt, Análise computacional de estruturas com aplicação do Método de Elementos Finitos, Ed. Unicamp, 2010.
- O. C. Zienkiewicz, R. L. Taylor, J. Z. Zhu, The Finite Element Method: Its Basis and Fundamentals, Butterworth-Heinemann; 7 ed., 2013.

Additional References:

- K. H. Huebner, et al, The Finite Element Method for Engineers, Wiley-Interscience, 2001.
- R. D. Cook, D. S. Malkus, M. E. Plesha, Concepts and Applications of Finite Element Analysis, John Wiley & Sons; 4 ed., 2001.
- Logan, D. L. A First Course in the Finite Element Method: Enhanced Edition, 6th Edition, Cengage Learning, 2022
- Jacob Fish, Ted Belytschko, A First Course in Finite Elements, Wiley, 2007.

Klaus-Jürgen Bathe, Finite Element Procedures - Second Edition, 2014.

GRADES (Including dates of exams, assignments and projects)

Deadlines	REPORTS, LIST OF EXERCISES, ETC. / DESCRIPTION	Rate
03/05	N1	0,4
28/06	N2	0,6
Grade (MP):		
Grade (Mp): $Mp = N1 \cdot 0.4 + N2 \cdot 0.6$		
Minimum grade without final exam: 5.0		
FINAL GRADE (NF): $NF = (Mp + E) / 2$		
Minimum grade for approval in the discipline 5.0		
OBSERVATIONS:	Minimum attendance for approval in the discipline is 75%	