

COURSE CODE	COURSE NAME		
COURSE CODE BAC.EAINA.OTMTH.2201	Differential Equations / Linear Algebra		
Credits	US Credits 4	/ ECTS Credits 8	
Student Workload	Contact Hours	Personal and/or Teamwork	Evaluation
	• 52.5	225	725
Teaching Language	English		
Corequisite	CALCULUS II		
Discipline	Other		
Course Manager	Yan Grasselli - yan.grasselli@skema.edu		
Instructor	Bruno.chastaingt-ext@skema.edu		
Course Description	This course is required in almost all engineering and science majors, it covers first order differential equations, higher order linear differential equations, numerical method, Laplace Transforms, series solutions and some topics in linear algebra for first order systems of linear differential equations.		
Learning Outcomes	<p>Matrices, eigenvalues, eigenvectors</p> <p>First order linear and nonlinear differential equations & applications</p> <p>Separate, exact, integrating factor</p> <p>Second and higher order linear differential equations & applications</p> <p>Wronskian, characteristic equation</p> <p>Undetermined coefficients, variation of parameters</p> <p>Series solutions near ordinary and regular singular point</p> <p>Euler Equations</p> <p>Laplace Transform</p> <p>Step and impulse functions, convolution</p> <p>System of first order linear differential equations and linear algebra</p> <p>Homogeneous and non-homogeneous systems</p> <p>Fourier Series</p>		
Course included in AACSB Assurance of Learning			
Transferable Competences	<input type="checkbox"/> Sustainability <input type="checkbox"/> Ethics <input checked="" type="checkbox"/> Artificial Intelligence <input type="checkbox"/> Technological Agility <input type="checkbox"/> Communication <input type="checkbox"/> Research Methods		

	<input type="checkbox"/> Other	
Teaching Methods	<input checked="" type="checkbox"/> Lectures <input type="checkbox"/> Blended Learning <input checked="" type="checkbox"/> Guided Personal Work <input checked="" type="checkbox"/> Autonomous Personal Work	<input type="checkbox"/> Case Study <input type="checkbox"/> Project <input type="checkbox"/> Seminar <input type="checkbox"/> Other <i>Please specify</i>
Student Assessment	Written Examination 2 midterms tests Final Exam	Coefficient % 40% 35%
	Continuous Assessment: 3 quizzes	Coefficient % 25%
Grading System	Please refer to the Academic Regulations for the grading system used in the BBA Program and further details and for information concerning absences, participation in class, plagiarism, etc.	
References / Books	Required for the course <i>Enter a brief reference to any required reading</i>	Recommended references Elementary differential equations, boundary values Boyce, Diprima, Willey (edition n°10)
Online reference material	Required for the course Completing all assigned readings prior to class and being prepared for an interactive discussion	Recommended references Readings, materials and tasks will be provided each week in K2.
COURSE CONTENT		
10/01/2024	Review of matrices: properties of matrices, determinant of matrix, inverse of matrix, Linear independence, eigenvalues, eigenvectors. (1h30)	
15/01/2024	Review of matrices: properties of matrices, determinant of matrix, inverse of matrix, Linear independence, eigenvalues, eigenvectors. (3h00)	
17/01/2024	Classification and solutions of some differential equations, First order linear differential equations, separable differential equations, modelling with first order differential equation. (1h30)	
22/01/2024	Exact differential equations and integrating factors, Numerical approximations, Euler's method, (3h00)	
24/01/2024	Second order differential equations, homogeneous equations with constant coefficients, Second order linear homogeneous differential equations, linear independence and Wronskian. (1h30)	
29/01/2024	Complex roots of the characteristic equation, repeated roots, reduction of order (3h00)	
31/01/2024	Nonhomogeneous differential equations, method of undetermined coefficients, method of variation of Parameters. (3h00)	

05/02/2024	Higher order linear homogeneous equations with constant coefficients. (3h00)
07/02/2024	Higher order linear homogeneous equations with constant coefficients. (1h30)
09/02/2024	Midterm n°1: 11:30 am-1:00 pm (1h30)
12/02/2024	Higher order linear nonhomogeneous equations method of undetermined coefficients, Higher order linear nonhomogeneous equations method of variation of parameters. (3h00)
14/02/2024	Review of power series, series solution near an ordinary point, regular singular point. (1h30)
19/02/2024	Euler, Bessel, Hermite, Chebyshev, Legendre, Laguerre differential equations, Series solution near a regular singular point. (3h00)
21/02/2024	Definition of Laplace transform, Solution of initial value problem using Laplace transform. (1h30)
26/02/2024	Step functions, Discontinuous forcing functions, Impulse functions. (3h00)
28/02/2024	Convolution integral and systems of linear differential equations. (1h30)
04/03/2024	Spring break
06/03/2024	Spring break
11/03/2024	Convolution integral and systems of linear differential equations. (3h00)
13/03/2024	System of first order differential equations. (3h00)
18/03/2024	System of first order differential equations. (3h00)
20/03/2024	System of first order differential equations: general theory, Homogeneous linear systems with constant coefficients. (1h30)
22/03/2024	Midterm n°2: 11:30 am-1:00 pm (1h30)
25/03/2024	System of first order differential equations: general theory, Homogeneous linear systems with constant coefficients. (3h00)
27/03/2024	Fourier series (1h30)
03/04/2024	Fourier series (3h00)

COMPETENCY BASED APPROACH

Competency	Learning objective(s): by the end of this course students should be able to...	Assessment	Marking criteria
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ECOLOGICAL TRANSITION

Please detail here how the ecological transition is explored in this course: (concepts, activities, group work, project, ...)
[Not applicable in this course.](#)

