Course Title: Advanced Applied Engineering Mathematics	**Number of Units:** 1
SSD :MAT/07	**CFU:** 9
Course aims: Introduction to mathematical modelling for Engineering. The course presents diffusion models, wave motion models, steady-state models, Euler-Bernoully model for beams, Finite Difference Method and Finite Element Method for Partial Differential Equations.	
Course Description Heat conduction and diffusion. Parabolic Partial Differential Equations. Initial boundary value problems. Finite Difference Method. Consistency. Convergence, Stability.Von Neuman criterion. Finite Element Method. Weak form. Dirac delta function. Elliptic partial differential equations and steady-state processes. Wave motions and hyperbolic partial differential equations. Euler-Bernoully equation and partial differential equations of higher order.	
Assumed Background: Calculus, Elementary Mechanics.	
Assessment methods: Oral examination	

Course Title: Advanced Linear Algebra	**Number of Units:** 1
SSD: MAT03	**CFU :** 6
Course aims: To provide students with a good understanding of the concepts and methods of advanced linear algebra aimed at solving engineering problems.	
Course Description: Symmetric bilinear and hermitian forms. Diagonalization of symmetric bilinear forms and Gauss algorithm. Sylvester's theorem. Tensor products of vector spaces. Symmetric tensors. Orthonormal bases and Gram-Schmidt process. Normal matrices. Spectral theorem. Projectors and spectral decomposition of Normal matrices. Hadamard's inequality. Gram matrices. Singular Value Decomposition. Matrix norms. Spectral norm. Exponential of a matrix. Dynamic mode decomposition of a linear system. Polar decomposition and Classical groups. LU, Choleski and QR factorizations.	
Assumed Background: Linear Algebra at undergraduate level	
Assessment methods: Oral examination.	