Course Package

Fields & Waves – 2A

Name module	Fields & Waves - 2A
Course Code	202000651
Educational programme	BSc Advanced Technology
Period	First quartile of the second semester (Block 2A)
Study load	15 ECTS
Coordinator	A.W. Schouwstra

Fields & Waves			
Block 1A	**Block 1B**	**Block 2A**	**Block 2B**
		Electro- and Magnetostatics **202000653** (9 EC)	
		Electromagnetic Radiation (Project Antenna) **202000654** (3 EC)	
		Finite Element Methods **202000652** (3 EC)	

Required preliminary knowledge: Vector Calculus (module Fundamentals of Materials, 202001230)

202000653 - Electro- and Magnetostatics

Electrostatics: electric field, Coulomb's Law, superposition of fields from charges and charge distributions, Gauss's Law, electrostatic potential, dipole, equations of Laplace and Poisson, dielectrics, electrostatic analogues;

Magnetostatics: magnetic field, Ampere's Law, Law of Biot and Savart, vector potential, current and current density, magnetic dipole, energy density.

202000654 - Electromagnetic Radiation (Project Antenna)

Electrostatics and magnetostatics are combined in the field of electrodynamics, the mutual interaction of electric and magnetic fields. This forms the basis to understand optical effects and wireless communication. This knowledge will have to be used in the project team for the design and realization of an antenna that works as well as possible within the 100 MHz range. To support the antenna design process the Finite Element Method is introduced.

The modules are tentative and subject to change. Please check the website regularly.

202000652 - **Finite Element Methods**

The Finite Element method is used in many engineering areas to evaluate a system described by (partial) differential equations such as fluid motion, thermal behaviour, mechanical stress and bending as well as electromagnetic phenomena. In many engineering problems it is actually a combination of these effects that play a role, for example the cooling of a mechanical structure to prevent thermal expansion with the flow of a cooling fluid. Working with a Finite Element method is not just asking the computer for an answer, as an answer it will give. Therefore this technique can only be used with a proper set-up of the problem and the validation of the results.