# CEM 833, 2012, module plan

Book: D. B. Davidson, *Computational Electromagnetics for RF and Microwave Engineering*, second edition, 2011.

Contacts: Prof. DB Davidson (lectures); Prof. MM Botha (tasks)

Lecture time slot: 11:00 to 13:00

| Week | Lecture date | Lecture contents | Task contents |
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| 1 | February 7 | • Introduction to CEM<br>• Thin wire MoM, static and dynamic<br>• §4.1 – 4.5, Ch. 5<br>• FEKO overview | • Code MoM for z-directed thin wire.<br>• Static with potential excitation<br>• Dynamic with voltage source excitation<br>• Dynamic with plane wave excitation<br>• Verification of results with FEKO |
| 2 | February 14 | • 2D, PEC MoM, dynamic<br>• §4.6 – 4.8<br>• FEKO pointers, as needed | • Code MoM for TM scattering from infinite PEC cylinder<br>• Verification of results with FEKO |
| 3 | February 21 | • 3D, PEC MoM, dynamic<br>• Ch. 6<br>• FEKO pointers, as needed | • Code visualization of RWG basis functions on arbitrary triangle<br>• Design and simulation of reflector antenna with Magus and FEKO. Compare MoM, MoM-PO and MLFMM. |
| 4 | February 28 | • 1D FDTD. Harmonic as well as pulsed excitation.<br>• Ch. 2 | • Assignment A2.1 (harmonic) |
| 5 | March 6 | • 2D FDTD.<br>• Ch. 3 | • Assignment A2.1 (pulsed)<br>• Second assignment: Add ABC to aan existing 2D FDTD code, which models radiation by a point source. |
| 6 | March 13 | • 1D FEM for transmission line<br>• Ch. 9 | • Implement this FEM with first-order basis functions<br>• Solve with various terminations (C, L, Z)<br>• Verify analytically |
| 7 | March 20 | • 2D FEM. Scalar, electrostatic case<br>• §10.1 – 10.4<br>• FEKO pointers, as needed | • Implement 2D electrostatic FEM., based on existing code framework.<br>• Calculate capacitance and potential field<br>• Verification of results with FEKO |

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| 8 | March 27 | • Built-in slack, in case it is needed | • Built-in slack, in case it is needed |

Version 1, dated 03 Feb 2012, MMB/DBD