General Information:

Name of Course:	**ELECTROMAGNETIC FIELDS**
Course Code:	PM-TVHNB161
Semester:	**3**
Number of Credits:	5
Allotment of Hours per Week:	2 Lectures /Week
Evaluation:	Signature (with grade) and exam
Prerequisites:	**None**

Instructor: **Dr. Gergely Nyitray**
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Introduction, General Course Description:

The aim of this course is to present the basic concepts of electromagnetism that students need to know for later courses and future careers. The topics are the following:
Electric field in vacuum, electric field in dielectrics, energy of an electric field, steady electric current, magnetic field in vacuum, magnetic field in substance, electromagnetic induction, Maxwell's equations, electrical oscillations, electromagnetic waves

Learning Objectives:

Problem-solving skills are reremain important, these include:
- Thinking logically and analitically,
- Making simplifying assumptions,
- Constructing mathematical models,
- Using valid approximations,
- Understanding the basic laws of electromagnetism.

Methodology:

- **Lectures**: will give an introduction to the electromagnetism
- **Homework:** The students will receive homework to be prepared.
- **Exams:** Accumulated knowledge is tested on the one hand in during the semester as a writing exam: the feature of the exam computational for finding solution for physical problems. In case the exam fails or the student want to improve the result a retake exam will be organized (up to two times). On the other hand students are required to take an oral exam in the examinations period. The student has to answer the question in such a way as to demonstrate sufficient knowledge of the subject to pass the exam.

Schedule:

Week	Topic of lecture
Week 1	Course description. Orientation. Electric charge, Coulomb's Law, Electric Field
Week 2	Field strength, Potential, Interaction Energy of a system of charges
Week 3	Relation between Electric Field Strength and Potential, Dipole, Gauss's Theorem
Week 4	Polar and Non-Polar Molecules, Polarization in Dielectric, Bound Charges
Week 5	Electric Displacement Vector, Conditions on the Interface Between two Dielectrics
Week 6	Ferroelectrics, Capacitance, Capacitors, Energy of a Charged Conductor and Electric Field

Week 7	Electric Current, The Classical Theory of Electrical Conductance of Metals
Week 8	Modern Theories of Electrical Conductance of Metals
Week 9	Magnetic Fields, The Biot-Savart Law, The Lorentz Force, Ampere's Law
Week 10	Magnetization of a Magnetics, Magnetic Field Strength, Conditions at the interface of two Magnetics, Kinds of Magnetics
Week 11	The Phenomenon of Electromagnetic Induction, Eddy-Currents, Self-Induction
Week 12	Mutual Induction, Energy of Magnetic Field, Displacement Current
Week 13	Maxwell's Equations, Electromagnetic Waves, Energy and Momentum of Electromagnetic Waves
Week 14	**Final exam**
Week 15	**Second exam** (only if required).

Attendance:

To be in class at the beginning time and stay until the scheduled end of the lesson is required, tardiness of more than 20 minutes will be counted as an absence. In the case of an illness or family emergency, the student must present a valid excuse, such as a doctor's note.

Grading:

20% - Homework (HW)
80% - Writing Exam (WE)
100% - Oral Exam (OE)
Grade - (HW+WE+OE)/2

Grade:	5	4	3	2	1
Evaluation in percents:	89%-100%	77%-88%	66%-76%	55%-65%	0-54%

Students with Special Needs:

Students with a disability and needs to request special accommodations, please, notify the Deans Office. Proper documentation of disability will be required. All attempts to provide an equal learning environment for all will be made.

Readings and Reference Materials:

Gambiattista, Richardson, Richardson: "College Physics" McGraw-Hill International Edition 2007 ISBN-13 978-0-07-110608-5

David J. Griffiths "Introduction to Electrodynamics" 2008 Pearson Education, Inc.publishing as