University of Tehran
School of Electrical and Computer Engineering

Course:	**Design of Rotating Small Electrical Machines**
Course type:	EE*: Com ☐, E ☐, P ☒, B ☐, Con ☐, D ☐ — CE*: SW ☐, HW ☐, IT ☐ — Credit: 3 — Required / Elective
Level:	Undergraduate ☐ Graduate ■
Co-requisite(s):	None.
Prerequisite(s):	Special Electrical Machines (8101326)
Prerequisite by topic:	
Textbook(s):	1. E. S. Hamdi, Design of Small Electrical Machines, John Wiely & Sons, New York, USA, 2012. 2. J. Pyrhonen, T. Jokinen and V. Hrabovcova, Design of Rotating Electrical Machines, Wiley, UK, 2014.
Coordinator:	Jawad Faiz, Professor, School of ECE.
Goals:	Designing different rotating small electrical machines.
Outcome:	Upon successful completion of the course, students will: 1. be able to design small and medium size electrical machines. 2. be familiar with mechanical and thermal considerations associated with design of small machines. 3. be familiar with various engineering materials used in small electrical machines. 4. be able to analyze and model heat transfer problems. 5. be familiar with general concepts and constraints of small electrical machine design. 6. be familiar with constructional details of different types of small electrical machines. 7. be able to present design procedures for small machines. 8. be able to apply finite element method for designing small electrical machines. 9. be familiar with structure and operational modes of these motors. 10. be able to apply computer aided design for design of small electrical machines. 11. be familiar with new types of electrical machines and their designs.
Topics:	1) Materials of Electrical Machines. 2) Fractional and Sub-Fractional Electrical Machines.

	3) Heating and Cooling Electrical Machines-Thermal Equivalent Circuit. 4) General Concepts and Constrains of Small Electrical Machines Design. 5) Design of Small Direct Current Machines. 6) Design of Small Single- and Three-phase Induction Machines. 7) Permanent Magnet Motors Design. 8) Computer-Aided-Design of Electrical Machines. 9) Design of Switched Reluctance Machines.
Computer usage:	Using a number of professional computer softwares for more efficient learning.
Assignments:	Homework
Projects:	Design of a typical small electrical machines.
Grading:	Assignments: 10 % Projects: 30 % Final exam: 60 %
Further readings:	[1] T. A. Lipo, Introduction to AC Machine Design, 3rd Edition, Wisconsin Power Electronics Research Center, University of Wisconsin, USA, 2007. [2] F. Gieras, and M. Wing, Permanent Magnet Motor Technology-Design and Applications, Marcel Dekker, New York,
Prepared by:	Ptof. Jawad Faiz
Date:	Nov. 20, 2017.

*EE: Electrical Engineering		CE: Computer Engineering	
Com	Communications	SW	Software
E	Electronics	HW	Hardware
P	Power	IT	Information Technology
B	Bioelectronics		
Con	Control		
D	Digital System		