Course Specifications

Program(s) on which this course is given:	Aerospace Engineering
Department offering the program:	**Department of Aerospace Engineering**
Department offering the course:	**Department of Aerospace Engineering**
Academic Level:	MSc
Date	2014-2015
Semester (based on final exam timing)	√☐Fall ☐Spring

A- Basic Information

1. Title:	Special Topics in Aeronautical Control			**Code:**	AER657			
2. Units/Credit hours per week:	Lectures	2	Tutorial		Practical	---	Total	2

B- Professional Information

1. Course description:	The scope of the course is quite broad. This is in order to show the multidisciplinary role of nonlinear dynamics and control. In particular, adaptive control, and Lypunov stability theory is provided. The objective of the stability analysis is to determine the system behavior without solving the differential, or difference, equations modeling the system.
2. Intended Learning Outcomes of Course (ILOs):	**a) Knowledge and Understanding**
	Different approaches of adaptive control.
	Different approaches of nonlinear control.
	Some advanced control techniques.
	b) Intellectual Skills
	Simulate advanced control systems.
	Analyze advanced control systems.
	Design advanced control systems.
	c) Professional and Practical Skills
	Use computer software packages to design, simulate, and evaluate advanced control systems.
	d) General and Transferable Skills
	Prepare effective and informative technical reports and present results on advanced control systems.
	Communicate effectively with colleagues to interchange knowledge and information in advanced control systems.

3. Contents

Topic	Total hours	Lectures hours	Tutorial/ Practical hours
Adaptive Control Systems.			
Process Modelling and Identification for Use in Self-tuning Controllers			
Algebraic Methods for Self-tuning Controller Design			
Phase Plane Analysis			
Describing Function Analysis			

Fundamentals of Lyapunov Theory			
4. Teaching and Learning Methods	Lectures (✓)	Practical Training/ Laboratory (✓)	Seminar/Workshop ()
	Class Activity (✓)	Case Study ()	Projects (✓)
	E-learning (0)	Assignments /Homework (✓)	Other:

5. Student Assessment Methods	
• **.Assessment Schedule**	**Week**
-Assessment 1; Project Assignments	3,5,7,9
-Assessment 2; Presentations	10
-Assessment 3; Midterm Exam	9
-Assessment 4; Final Exam	16
• **Weighting of Assessments**	
-Mid-Term Examination	10
-Final-term Examination	80
-Project	5
-Class Test	5
-Total	100

6. List of References

V. Bobal, J. Bohm, J. Fessl and J. Machacek, "Digital Self-tuning Controllers: Algorithms, Implementation and Applications", Springer-Verlag London Limited, 2005.

Jean-Jacques E Slotine, Weiping Li, "Applied Nonlinear Control", Prentice Hall,1991

Roland S. Burns, "Advanced Control Engineering", Butterworth-Heinemann, 2001.

Stanislaw H. Zak, "Systems and Control", Oxford University Press, 2003.

Library resources, Internet search of periodicals

7. Facilities Required for Teaching and Learning

Computer lab

Course Coordinator:	**Prof. Gamal El-Bayoumi**
Head of Department:	**Dr. Ayman H. Kassem**