Course Specifications

Program(s) on which this course is given:	Ph.D.
Department offering the program:	Aerospace engineering
Department offering the course:	Aerospace engineering
Academic Level:	Post graduate
Date	March 2015
Semester (based on final exam timing)	☐ Fall ☐ Spring✓

A- Basic Information

1. Title:	Simulation and Control of Propulsion Systems				**Code:**	AER 772		
2. Units/Credit hours per week:	Lectures	3	Tutorial	---	Practical	---	Total	3

B- Professional Information

1. Coursedescription:	This course develops gas turbine engine transient modeling including the engine feed system. Both linearized and non-linear analyses are covered. Engine controller approaches to design are considered.
2. Intended Learning Outcomes of Course (ILOs):	**a) Knowledge and Understanding**
	Understand the modeling techniques of gas turbine engines
	Understand the modeling of engine fuel feed system
	Understand fuzzy control for gas turbine engine control
	b) Intellectual Skills
	Synthesize the modeling process of dynamic systems
	Synthesize the control process of gas turbine engines
	c) Professional and Practical Skills
	Enhance research capabilities
	Using Matlab and Simulink for modeling and control of gas turbine engines
	d) General and Transferable Skills
	Model interactive subsystems

3. Contents

Topic	Total hours	Lectures hours	Tutorial/ Practical hours
Single spool/two spool turbojet engine linearized transient model	9	9	----
Non-linear transient model	3	3	----
Engine limits constraints	3	3	----
Engine driven fuel pump/injector characteristics	3	3	----
Throttle valve regulation- fuel flow evaluation	6	6	----
Introduction to engine control	3	3	----
Fuzzy control	9	9	----
Integration of model and controller	6	6	----
Optimization of control system	3	3	----

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

5. Student Assessment Methods	
• **Assessment Schedule**	**Week**
-Assessment 1;Class test	
-Assessment 1; Project Assignment	4
-Assessment 2; Project Assignment	
-Assessment 3; Midterm Exam	
-Assessment 4; Final Exam	15
• **Weighting of Assessments**	
-Mid-Term Examination	
-Final-term Examination	70%
-Project	30%
-Class Test	
-Presentation	
-Total	100%

6. List of References
Simulation of linearized dynamics of GTE -NACA Technical Notes (2826 - 3274)
Paper in Non-Linear Turbofan Engine simulation (A.A. Hashem, T.R. Nada)
Many papers, research reports/postgraduate theses as related to various topics (to be made available to students)

7. Facilities Required for Teaching and Learning
Data show-laptop-internet

Course Coordinator:	Prof. A.A.Hashem
Head of Department:	Prof. A.H.Kasem