Cairo University
Faculty of Engineering

Aerospace Engineering Department

Course Specifications

Program(s) on which this course is given:	Master of Science Program
Department offering the program:	Department of Aerospace Engineering
Department offering the course:	Department of Aerospace Engineering
Academic Level:	Post Graduate
Date	March 2015
Semester (based on final exam timing)	Spring

A- Basic Information

1. Title:	Rocket Engines			Code:	AER 672			
2. Units/Credit hours per week:	Lectures	3	Tutorial	0	Practical	0	Total	3

B- Professional Information

1. Course description:	This course introduces the kinematical theory of chemistry, thermodynamics of chemistry, fuel atomization and droplet combustion. Combustion stability, flame combination and propagation, pollution, models of solid propellant combustion, models of liquid propellant combustion are presented.
2. Intended Learning Outcomes of Course (ILOs):	**a) Knowledge and Understanding**
	Know systems of rocket engines
	Know thermochemistry of rocket engines
	Know nozzle theory
	b) Intellectual Skills
	Analyze the combustion stability of solid and liquid rocket engines
	Compute the transient performance of liquid rocket engines
	Compute the interior ballistics of solid propellant grains
	c) Professional and Practical Skills
	Design liquid rocket injectors
	Design cooling system of thrust chambers
	d) General and Transferable Skills
	Apply thermochemical analysis to thermodynamic processes Apply transient analysis to different engineering applications

3. Contents			
Topic	Total hours	Lectures hours	Tutorial/ Practical hours
Systems of rocket engines and their performance		6	-
Nozzle theory and thermochemical analysis		6	-
Propellant Injection and injectors design		6	-
Interior ballistics of solid rocket engines		6	-
Transient analysis of liquid rocket systems		9	-
Combustion instability of rocket engines		6	-
Cooling systems of thrust chambers		6	-
4. Teaching and Learning Methods	Lectures (✓)	Practical Training/ Laboratory (-)	Seminar/Workshop (-)
	Class Activity (Two Quiz)	Case Study (✓)	Projects (1)
	E-learning (Moodle Platform)	Assignments /Homework (4)	Other: (Development of computer codes)

5. **Student Assessment Methods**	
• Assessment Schedule	Week
-Assessment 1; Homework	3
-Assessment 2; Homework	5
-Assessment 3; Quiz	7
-Assessment 4; Homework	8
-Assessment 5; Midterm Exam	9
-Assessment 6; Final Exam	16
• Weighting of Assessments	
-Mid-Term Examination	15
-Final-term Examination	70
- Homework and Quiz	15
-Total	100

6. List of References

- G.P. Sutton " Rocket propulsion Elements", Publisher JOHN WILEY & SONS, INC., ISBN 0-471-32642-9
- M.J. Turner" Rocket and Spacecraft Propulsion Principles, Practice and New Developments", Publisher Springer, ISBN 978-3-540-69202-7

7. Facilities Required for Teaching and Learning: Data Show, Wireless Internet and Propulsion Lab.

Course Coordinator:	Prof. Farouk Owis
Head of Department:	Prof. Ayman H. Kassem