Cairo University
Faculty of Engineering

Aerospace Engineering Department

Course Specifications

Program(s) on which this course is given:	Flight Mechanics and Control Specialization
Department offering the program:	Aerospace Engineering
Department offering the course:	Aerospace Engineering
Academic Level:	Graduate
Date	
Semester (based on final exam timing)	☐ Fall ☐ Spring

A- Basic Information

1. Title:	Satellite Design			**Code:**	Aero 795			
2. Units/Credit hours per week:	Lectures	2	Tutorial	1	Practical	-	Total	3

B- Professional Information

1. Course description:	The course aims at giving the knowledge and training necessary for preliminary design of small low-earth satellites and their subsystems. The subjects addressed in the course are: 1)Satellite missions-2) mission analysis-3) Overall satellite requirements and design specifications 4)Satellite systems-5) Satellite structure and mass budget-6)Attitude Determination and Control Subsystem-Sensors and actuators-7) Power system and power budget- 8)Communication Subsystem 9)Telemetry and Command subsystem-10)Optical Payload Subsystem. 11) Redundancy and reliability.
2.Intended Learning Outcomes of Course (ILO's):	**a) Knowledge and Understanding**
	Knowledge and Understanding of the factors affecting satellite design. Knowledge of the physical laws underlying the design. Knowledge of the different alternatives in the design and the advantages or disadvantages of each.
	b) Intellectual Skills
	Ability to design the satellite systems based on the physical principles and experience given in the course.
	c) Professional and Practical Skills
	Principles and methodologies for Design and building of satellite subsystems
	d) General and Transferable Skills
	General Design methodologies - SolidWorks software

3. Contents

Topic	Total hours	Lectures hours	Tutorial/ Practical hours
Satellite missions, mission analysis,	3	2	1
Overall satellite requirements and design specifications	3	2	1
Satellite subsystems-General description, function and configuration	6	4	2
Satellite structure and mass budget - Power system and power budget	6	4	2
Attitude Determination and Control Subsystem- Attitude System Sensors and actuators - Sizing of Reaction wheels and momentum exchange motion-	9	6	3
Design Optical Payload Subsystem.	6	4	2

Communication Subsystem	6	4	2
Telemetry and Command subsystem-	3	2	1
Redundancy and reliability.	3	2	1
Total Hours	45	30	15
4. Teaching and Learning Methods	Lectures (24)	Practical Training/ Laboratory (9)	Seminar/ Workshop (-)
	Class Activity (6)	Case Study (-)	Projects (6)
	E-learning (-)	Assignments /Homework (-)	Other:

5. Student Assessment Methods

• **Assessment Schedule**	**Week**
-Assessment 1: Class test	6th week
- Assessment 2: Class assignments (Homework)	Every other week (6 assignments)
-Assessment 3; Project Assignment	4th week
-Assessment 4; Presentations	N/A
-Assessment 5; Midterm Exam	8th week
-Assessment 6; Final Exam	End of semester

a- **Weighting of Assessments**

-Mid-Term Examination	15%
-Final-term Examination	60%
-Class assignments (Homework and project)	15%
-Class Test (s)	10%
-Presentation	N/A
-Total	100%

6. List of References

Wertz, Spacecraft attitude determination and control, Kluwer Academic Publishers

7. Facilities Required for Teaching and Learning

Projector

Course Coordinator:	**Prof. Mohamed Bahey Argoun**
Head of Department:	**Prof. Ayman Hamdy Kassem**