Cairo University
Faculty of Engineering

Department of Aerospace Engineering

Course Specifications

Program(s) on which this course is given:	Aerospace Engineering
Department offering the program:	Aerospace Engineering Department
Department offering the course:	Aerospace Engineering Department
Academic Level:	Doctor of Philosophy
Date	
Semester (based on final exam timing)	☐ Fall ☐ Spring

A- Basic Information

1. Title:	Acoustic Signal Processing			**Code:**	AER 737			
2. Units/Credit hours per week:	Lectures	2	Tutorial	0	Practical	0	Total	2

B- Professional Information

1. Course description:	This course aims at estimating the location of acoustic sources as well as the number of them. This is accomplished by studying the following: Acoustic wavefields, wavefield decomposition, waveform estimation, parameter estimation, classical array signal processing (Beamforming, TDOA, Subspace DOA estimation), Modal array signal processing (Eigenbeam processing), applications
2. Intended Learning Outcomes of Course (ILOs):	**a) Knowledge and Understanding**
	1) Understand the advanced structures of Aerospace vehicles
	2) Understand classical array signal processing algorithms
	3) Understand array signal processing algorithms based on acoustic wave equation
	b) Intellectual Skills
	4) Summarize and select the appropriate solution Methodology
	5) Calculate the acoustic source location using beamforming
	6) Calculate the acoustic source location using a signal sunspace method
	7) Calculate the acoustic source location using modal array signal processing
	c) Professional and Practical Skills
	8) Structural synthesize and/or design of a complete aerospace vehicle
	9)
	d) General and Transferable Skills
	10) Solve problems
	11) Analyze results and reach conclusion

3. Contents

Topic	Total hours	Lectures hours	Tutorial/ Practical hours
Acoustic wavefields	2	2	
Wavefield decomposition	6	4	2
Classical array signal processing	6	4	2
Modal array signal processing	6	4	2
Practical signal processing systems	4	2	2

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 Activity		2	
-Assessment 2; Class Activity		3	
-Assessment 3; Class Activity		4	
-Assessment 4; Class Activity		5	
-Assessment 5; Midterm Exam		7	
-Assessment 6; Class Activity		8	
-Assessment 7; Class Activity		10	
-Assessment 8; Class Activity		12	
-Assessment 9; Final Exam		15	
• **Weighting of Assessments**			
-Mid-Term Examination		7	
-Final-term Examination		70	
-Class Activity		20	
-Class Attendance		3	
-Total		100	
6. List of References			
1) Heinz Teutsch, Modal Array Signal Processing Principles and Applications of Acoustic Wavefield Decomposition, Springer-Verlag, 2007			
7. Facilities Required for Teaching and Learning			
Projector, white board, Modal analysis laboratory (Signal analyzer, multichannel dynamic data acquisition, vibration sensors (accelerometers), force transducers, programmable function generators, shakers, impact hummer, test structure, data acquisition/analysis software, experimental modal analysis software)			
Course Coordinator:	**Dr. Ahmed Mohamed Rashed Desoki**		
Head of Department:	**Prof. Ayman Hamdy Kassem**		