COURSE INFORMATION

Course Code	AAM 565	Course Name	Rotorcraft Design					
Type of Course	**Level of Course**	**Semester**	**Language**	**Theory**	**Application (Practice)**	**Laboratory**	**Local Credits**	**ECTS**
Elective	Graduate	1	English	3	0	0	3	6

Department	: Aerospace Engineering
Prerequisites/Requirements for Admission	: None
Mode of Delivery	: Face to face
Course Coordinator	: Assist. Prof. Dr. Reza Aghazadeh
Course Lecturer(s)	: Dr. Ceyhun Tola
Course Assistant(s)	:
Course Description/Aim	: The aim of the course is to teach the fundamentals of rotorcraft flight and the preliminary design of rotary wing aircrafts.
Course Contents	: History of the helicopters, Vertical Take-off and Landing (VTOL) aircrafts, Fundamentals of helicopter flight, Elements of helicopter, Basic maneuvers, Introduction to rotor aerodynamics, Climb and descent, Factors effecting vertical flight, Forward flight, Tandem and coaxial helicopters, Analysis of blade motion, Basic helicopter performance, Conceptual design of helicopters.
Recommended Optional Program Components	: None
Compulsory Attendance	: 70% attendance is mandatory.

Course Learning Outcomes

#	Learning outcome	Teaching Methods/Techniques	Assessment method(s)
At the end of this course; students will be able to:			
1	Identify the basic parts of helicopters.	Lecture, On-line Activity	Written Exam
2	Define those parts, effects on design.	Lecture, Case Study, Discussion, On-line Activity	Written Exam, Homework
3	Explain the principles of control elements.	Lecture, Case Study, Discussion, On-line Activity	Written Exam, Homework
4	Discuss the issues in helicopter technology.	Lecture, Case Study, Discussion, On-line Activity	Written Exam
5	Calculate the power requirements for hover using momentum theory.	Lecture, Case Study, Discussion, On-line Activity	Written Exam, Homework
6	Calculate the power requirements for climb using momentum theory.	Lecture, Case Study, Discussion, On-line Activity	Written Exam, Homework
7	Calculate the power requirements for forward flight using momentum theory.	Lecture, Case Study, Discussion, On-line Activity	Written Exam, Homework

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Weekly Detailed Course Content

Week	Content	Recommended Resource(s)	Time (Hours)
1	History of the helicopters	Textbook/Lecture Notes	3
2	Vertical Take-off and Landing (VTOL) aircrafts	Textbook/Lecture Notes	3
3	Fundamentals of helicopter flight	Textbook/Lecture Notes	3
4	Elements of helicopter	Textbook/Lecture Notes	3
5	Basic maneuvers	Textbook/Lecture Notes	3
6	Introduction to rotor aerodynamics	Textbook/Lecture Notes	3
7	Climb and descent	Textbook/Lecture Notes	3
8	Midterm Exam		3
9	Factors effecting vertical flight	Textbook/Lecture Notes	3
10	Forward flight	Textbook/Lecture Notes	3
11	Tandem and coaxial helicopters	Textbook/Lecture Notes	3
12	Analysis of blade motion	Textbook/Lecture Notes	3
13	Basic helicopter performance	Textbook/Lecture Notes	3
14	Conceptual design of helicopters	Textbook/Lecture Notes	3
15	Final Exam		3
16	Final Exam		3

Sources

Course Notes / Textbooks	: Leishman, G., 2006. Principles of Helicopter Aerodynamics, Cambridge Aerospace Series. Johnson, W., 1994, Helicopter Theory.
Supplemental Readings	: Prouty, R.W., 1986. Helicopter Performance, Stability, and Control, Prindle, Weber & Schmidt. Stanley, J.D., 1984. Helicopter Design and Data Book, Aviation Publications.

Evaluation System

Work Placement	Number	Percentage of Grade
Attendance		
Quizzes		
Homework	3	15%
Presentation		
Laboratory/Practice		
Report(s)		
Graduate Thesis/Project		
Seminar		
Projects		
Midterm exam(s)	1	35%
Others		
Final exam	1	50%
	Total	100%
	Percentage of semester work	50%
	Percentage of final exam	50%
	Total	100%

COURSE INFORMATION

Workload Calculation

Activity	Number	Time (hours)	Total Work Load (hours)
Course Hours	14	3	42
On-line Activity Hours			
Individual study	14	6	84
Midterm exam(s)	1	2	2
Final exam	1	2	2
Homework	3	16	48
Presentation			
Project			
Application (Practice)			
Laboratory			
		Total	178
		ECTS Credit *(Total/30)*	6

Contribution of Learning Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
LO1	**4**	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**
LO2	**5**	**2**	**4**	**4**	**2**	**1**	**3**	**3**	**2**
LO3	**5**	**2**	**3**	**4**	**2**	**1**	**3**	**3**	**2**
LO4	**4**	**2**	**3**	**4**	**2**	**2**	**3**	**3**	**2**
LO5	**5**	**2**	**3**	**4**	**2**	**1**	**3**	**3**	**2**
LO6	**5**	**2**	**3**	**4**	**2**	**1**	**3**	**3**	**2**
LO7	**5**	**2**	**3**	**4**	**2**	**1**	**3**	**3**	**2**

Contribution Level : 1: “Very low”, 2: “Low”, 3: “Medium”, 4: “High”, 5: “Very High”
LO: Learning Outcome of the Course
PO: Program Outcome