

<p>Kingdom of Saudi Arabia Ministry of Higher Education Qassim University College of Engineering</p>		<p>المملكة العربية السعودية وزارة التعليم العالي جامعة القصيم كلية الهندسة</p>
---	--	--

Flight Dynamics & Control

College: Engineering

Department: Mechanical Engineering

First: Course Definition

1- Course Code: ME 669

2- Units : 3 credit hrs

3 – Semester:

4 -Prerequisite

5- Co-requisite

6- Location (if not on main Campus):

Second: Course Objectives

1. *Derive and formulate the equations of flight motion: longitudinal and lateral.*
2. *Determine the response of flight vehicles to control or input.*
3. *Design, integrate and solve flight dynamics and control problems using classical and modern automatic control theory.*
4. *Apply numerical techniques to solve flight dynamics and control problems using Matlab*

Third: Course Specifications

1- Topics to be covered		
Subject	No of Weeks	Units
Introduction to atmospheric flight	1	3
Static and dynamic stability	3	9
Aircraft equations of motion	3	9
Response to control or inputs,	3	9
Flying qualities	2	6

<p>Kingdom of Saudi Arabia Ministry of Higher Education Qassim University College of Engineering</p>		<p>المملكة العربية السعودية وزارة التعليم العالي جامعة القصيم كلية الهندسة</p>
---	--	--

Applications of classic and modern control theories to autopilot design	3	9
2- Course components (Total hrs in the Semester)		

Lecture	Exercise or lab	Other
45	---	

3- Intended Learning Outcomes of the Course (ILO's)

a. Knowledge

i) Description of the knowledge to be acquired:

- Understanding the concept of static and dynamic stability
- Developing the understanding of the effect of each component of the aircraft on its static stability.

ii) Teaching strategies to be used to develop that knowledge

- Lectures and tutorials
- Home assignments
- Open class discussions and forums
- Case study report using data collection, internet search, numerical computation, simulation, and reporting
- Matlab sessions

iii) Methods of assessment of knowledge acquired

- Home assignments
- Quizzes
- Midterm Exams
- Term Project
- Final Exam

b- Cognitive (Intellectual) Skills

i) Cognitive skills to be developed

- Ability to derive and formulate the equations of flight motion, longitudinal and lateral motion and response to control or input.

<p>Kingdom of Saudi Arabia Ministry of Higher Education Qassim University College of Engineering</p>		<p>المملكة العربية السعودية وزارة التعليم العالي جامعة القصيم كلية الهندسة</p>
--	--	--

- Ability to design, integrate and solve flight dynamics and control problems using classical and modern automatic control theory .
- Ability to apply numerical techniques to solve flight dynamics and control problems using Matlab.

ii) Teaching strategies to be used to develop these cognitive skills

- Lectures and tutorials
- Home assignments
- Open class discussions and forums
- Case study report using data collection, internet search, numerical computation, simulation, and reporting
- Matlab sessions

iii) Methods of assessment of students cognitive skills

- Home assignments
- Quizzes
- Midterm Exams
- Term Project
- Final Exam

c. Interpersonal Skills and Responsibility

i) Description of the interpersonal skills and capacity to carry responsibility to be developed

- Team work in Term project and Assignments

ii) Teaching strategies to be used to develop these skills

- Home assignments (group)
- Open class discussions and forums
- Case study report using data collection, internet search, numerical computation, simulation, and reporting

iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility

- Home assignments.

<p>Kingdom of Saudi Arabia Ministry of Higher Education Qassim University College of Engineering</p>		<p>المملكة العربية السعودية وزارة التعليم العالي جامعة القصيم كلية الهندسة</p>
---	--	---

- Quizzes.
- Term Project.

d. Communication, Information Technology and Numerical Skills

i) Description of the skills to be developed in this domain

- Ability to use the internet to search for specific information in the area of flight dynamics and control
- Ability to use the available numerical computational tools such as Matlab and Simulink to analyze and design flight dynamics problems.
- Ability to use the modern presentation techniques to demonstrate the students' ideas and work.

ii) Teaching strategies to be used to develop these skills

- Lectures.
- Assignments, at home.
- Case study report using data collection, internet search, numerical computation, simulation, and reporting

iii) Methods of assessment of students numerical and communication skills

- Home assignments.
- Term Project.

e. Psychomotor (if applicable) & Other Non-cognitive Skills

i) Description of the psychomotor or other skills to be developed and the level of performance required

ii) Teaching strategies to be used to develop these skills

iii) Methods of assessment of student's psychomotor skills

4- Student Assessment Schedule

<p>Kingdom of Saudi Arabia Ministry of Higher Education Qassim University College of Engineering</p>		<p>المملكة العربية السعودية وزارة التعليم العالي جامعة القصيم كلية الهندسة</p>
--	--	--

Assessment	Assessment task (test, group project, examination etc.)	Week due	Weight of
1	Quiz 1	Week 2	4%
2	Quiz 2	Week 4	4%
3	Quiz 3	Week 6	16%
4	Mid Term Exam1	Week 7	15%
5	Case Study Term project & Regular Assignments	Week 8	5%
6	Quiz 4	Week 9	4%
7	Quiz 5	Week 11	4%
8	Mid Term Exam2	Week 13	15%
9	Quiz 6	Week 14	4%
10	Final Exam	Week 16	50%

5- Student Support

- Arrangements for availability of faculty for individual student consultations and academic advice. (Include amount of time faculty are available each week.
- Three (3) Office hours per week are offered by the instructor to aid the students and support them.

6- Learning Resources

i) Essential Books (References)

R. C. Nelson, "Flight Stability and Automatic Control", 2nd Edition, McGraw-Hill, 1998

ii) Course Notes

Course notes will be developed as a support to the text book

iii) Recommended Books

1. B. Etkin and L. D. Reid, "Dynamics of Flight, Stability and Control", 3rd Edition, Wiley 1996.
2. D. McLean, "Automatic Flight Control Systems", Prentice Hall, 1990.

iv) Electronic Books & Web Sites:

www.mathworks.com

<p>Kingdom of Saudi Arabia Ministry of Higher Education Qassim University College of Engineering</p>		<p>المملكة العربية السعودية وزارة التعليم العالي جامعة القصيم كلية الهندسة</p>
---	--	---

v) Periodicals

- Journal Of Guidance, Control, And Dynamics
- IEEE Conferences and Journals

7- Course Evaluation and Improvement Processes

i) Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- Questionnaire,
- Observing the students opinions recorded in the college student sit
- Appeal box
- Carrying out extensive questioners by a sample of the distinguished students just after the graduation from the college

ii) Other Strategies for Evaluation of Teaching by the Instructor or by the Department

- Periodical review of the teaching methods by both the department council and the education affairs vice dean
- Questionnaire,
- Observing the students opinions recorded in the college student site.

iii) Processes for Improvement of Teaching

- Evaluation of the course outlines by external staff member from outside the university
- Periodical contact with the different engineering authorities and industries for evaluating and getting their feedback and suggestions concerning the course outlines .

iv) Processes for verifying standards of student achievement (e.g. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution)

- Check marking of a sample of student work by an independent faculty member

<p>Kingdom of Saudi Arabia Ministry of Higher Education Qassim University College of Engineering</p>	 <p>The logo of Qassim University features a stylized blue grid pattern above the text 'Qassim University' in a blue serif font. To the right of the English text is the university's name in Arabic calligraphy: 'جامعة القصيم'.</p>	<p>المملكة العربية السعودية وزارة التعليم العالي جامعة القصيم كلية الهندسة</p>
--	---	--

v) Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

- Assessment and evaluation of the level of achieving the course outcomes through a continuous improvement process (part of a quality assurance system established by the university).
- Consequently, actions are to be taken to improve the course delivery when necessary.
- Review of the course objectives, outcomes and curriculum each 2 years.