



Course Specifications

| | |
|----------------------|--|
| Course Title: | Machine Dynamics |
| Course Code: | ME 243 |
| Program: | B.Sc. Mechanical and Industrial Engineering |
| Department: | Mechanical and Industrial Engineering |
| College: | Engineering |
| Institution: | Majmaah University |

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A. Course Identification

| | |
|---|--|
| 1. Credit hours: | 3(3,1,0) |
| 2. Course type | |
| a. | University <input checked="" type="checkbox"/> College <input checked="" type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input checked="" type="checkbox"/> |
| b. | Required <input checked="" type="checkbox"/> Elective <input checked="" type="checkbox"/> |
| 3. Level/year at which this course is offered: | Level 5 th / 3 rd 1440-1441H (2019-2020) First Semester |
| 4. Pre-requisites for this course (if any): | GE 105 |
| 5. Co-requisites for this course (if any): | NA |

6. Mode of Instruction (mark all that apply)

| No | Mode of Instruction | Contact Hours | Percentage |
|----|-----------------------|---------------|------------|
| 1 | Traditional classroom | 60 | 80 |
| 2 | Blended | 05 | 10 |
| 3 | E-learning | 05 | 10 |
| 4 | Correspondence | 0 | -- |
| 5 | Other | 0 | -- |

7. Actual Learning Hours (based on academic semester)

| No | Activity | Learning Hours |
|------------------------------|---------------------------------|----------------|
| Contact Hours | | |
| 1 | Lecture | 45 |
| 2 | Laboratory/Studio | 0 |
| 3 | Tutorial | 15 |
| 4 | Others (specify) | 0 |
| | Total | 60 |
| Other Learning Hours* | | |
| 1 | Study | 20 |
| 2 | Assignments | 20 |
| 3 | Library | - |
| 4 | Projects/Research Essays/Theses | - |
| 5 | Others (specify) | |
| | Total | 40 |

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times.

B. Course Objectives and Learning Outcomes

1. Course Description

Design of ordinary gear trains and analysis of epicyclic gear trains. Analytical design of disk cams. Grashof rules. Design of mechanisms in terms of transmission angle and time ratio. Kinematic and force analysis of linkages and machinery with the aid of computers. Flywheel design. Balancing. Lab work includes applications on gear trains and linkages.

2. Course Main Objective

- Understand the different parts of machines (e.g. gear, cam, and flywheel) and realize; the objectives of them, how to analyze their motion and the forces on them,
- Be able to design gear-train, cams, and flywheels,
- Skills of hand drawing of sketches,
- Apply knowledge of mathematics, science, and engineering.

3. Course Learning Outcomes

| CLOs | | Aligned PLOs |
|------|---|--------------|
| 1 | Knowledge: | |
| 1.1 | To learn about the type of gears, follower, and cams, | a(d1) |
| 1.2 | To develop the skills of idealization of gears and flywheel, | a(d1) |
| 1.3 | Draw displacement, velocity, and acceleration diagram of follower, | a(d1) |
| 2 | Skills : | |
| 2.1 | Make a full design of gear box, | c(b2) |
| 2.2 | Draw the cam profile of cam, | k(d3) |
| 2.3 | Make a full design of flywheel, | c(b2) |
| 2.4 | To learn about influence of corrected, and uncorrected (standard) gears, | a(d1) |
| 2.5 | To learn about balancing of machine. | a(d1) |
| 2.6 | Thinking through problems solving, reasoning for each problem solved, | k(d3) |
| 2.7 | Remembering equations and principles, | a(d1) |
| 2.8 | Reasoning in solving a problem step by step. | a(d1) |
| 3 | Competence: | |
| 3.1 | Mathematical skills, | a(d1) |
| 3.2 | Asking students to solve problems and explaining to the class the steps and summarize the problem | k(d3) |

C. Course Content

| No | List of Topics | Contact Hours |
|--------------|--|---------------|
| 1 | Design of ordinary gear trains and analysis of epicyclic gear trains | 8 |
| 2 | Analytical design of disk cams | 8 |
| 3 | Grashof rules | 12 |
| 4 | Design of mechanisms in terms of transmission angle and time ratio. | 4 |
| 5 | Design of Flywheel. | 8 |
| 6 | Balancing | 8 |
| 7 | Lab work includes applications on gear trains and linkages | 4 |
| 8 | Kinematic and force analysis of linkages and machinery with the aid of comp. | 8 |
| Total | | 60 |

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | Teaching Strategies | Assessment Methods |
|------|--|--|--|
| 1.0 | Knowledge | | |
| 1.1 | To learn about the type of gears, follower, and cams, | Lectures, tutorials and self-learning assignments. | Attendance of lectures and tutorials is a most. |
| 1.2 | To develop the skills of idealization of gears and flywheel, | Introductory lecture gives an overview of the content and methods of assessment. | Attendance of lectures and tutorials is a most. There will be no. of quizzes, homeworks, two midterm examination and one final examination. Examinations are comprehensive, including subjects from all assigned readings, lectures, and classroom demonstrations. |
| 1.3 | Draw displacement, velocity, and acceleration diagram of follower, | Assignments require use of reference textbook from library and websites from internet. Homework assignments will consist of problem solving cases. | Tools: a. Mid Term Exam 1 to measure Knowledge and understanding, b. Mid Term Exam 2 to measure Knowledge and understanding, c. Final Exam to measure Knowledge and understanding. Quizzes and Homework to measure Knowledge and understanding |
| 2.0 | Skills | | |
| 2.1 | Make a full design of gear box, | | Quizzes and homeworks on completion of each topic to measure knowledge items. |
| 2.2 | Draw the cam profile of cam, | | |
| 2.3 | Make a full design of flywheel, | | |
| 2.4 | To learn about influence of corrected, and uncorrected (standard) gears, | | |

| Code | Course Learning Outcomes | Teaching Strategies | Assessment Methods |
|------------|--|--|--|
| 2.5 | To learn about balancing of machine. | | |
| 2.6 | Thinking through problems solving, reasoning for each problem solved, | Lectures, tutorials and self-learning assignments. | Attendance of lectures and tutorials is a most. |
| 2.7 | Remembering equations and principles, | Introductory lecture gives an overview of the content and methods of assessment. | Attendance of lectures and tutorials is a most. There will be no. of quizzes, homeworks, two midterm examination and one final examination. Examinations are comprehensive, including subjects from all assigned readings, lectures, and classroom demonstrations. |
| 2.8 | Reasoning in solving a problem step by step. | Tutorials review the content of each lecture. Assignments require use of reference textbook from library and websites from internet. | Quizzes and homeworks on completion of each topic to measure knowledge items. Tools: <ul style="list-style-type: none"> •Mid Term Exam 1 to measure Knowledge and understanding, •Mid Term Exam 2 to measure Knowledge and understanding, •Final Exam to measure Knowledge and understanding, Quizzes and Homework to measure Knowledge and understanding |
| 3.0 | Competence | | |
| 3.1 | Mathematical skills, | Lectures, tutorials and self-learning assignments. | Attendance of lectures and tutorials is a most. |
| 3.2 | Asking students to solve problems and explaining to the class the steps and summarize the problem in Arabic. | Introductory lecture gives an overview of the content and | Attendance of lectures and tutorials is a most. |

| Code | Course Learning Outcomes | Teaching Strategies | Assessment Methods |
|------|--------------------------|------------------------|--------------------|
| | | methods of assessment. | |

2. Assessment Tasks for Students

| # | Assessment task* | Week Due | Percentage of Total Assessment Score |
|---|----------------------|-----------------|--------------------------------------|
| 1 | First Major Exam | 6th week | 20 % |
| 2 | Second Major Exam | 12th week | 20 % |
| 3 | Final Exam | Final exam week | 40 % |
| 4 | Quiz | Continuous | 10 % |
| 5 | Homework assignments | Continuous | 10 % |

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

Sun. 08.00:09.50,
 Mon. 08.00:08.50,
 Mon. 09.00:09.50

F. Learning Resources and Facilities

1. Learning Resources

| | |
|---------------------------------------|--|
| Required Textbooks | "Theory of Machine", by R.S. Khurmi, and J.K Gupta. |
| Essential References Materials | <ul style="list-style-type: none"> • "Analysis of Mechanisms and Machinery", by M. Akyurt, KAU Center for Sci. Publ. Jeddah, 1991. • E. Soylemez, "Mechanisms" METU Publication No.64, 1999. |
| Electronic Materials | Sufficiently of Material available on the net. |
| Other Learning Materials | Handouts |

2. Facilities Required

| Item | Resources |
|--|--|
| Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) | <ul style="list-style-type: none"> • Lecture room • A02 (Sunday) • A03 (Monday) |
| Technology Resources (AV, data show, Smart Board, software, etc.) | <ul style="list-style-type: none"> • Computer and internet • Data show, • Smart board |

| Item | Resources |
|--|-----------|
| Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list) | None |

G. Course Quality Evaluation

| Evaluation Areas/Issues | Evaluators | Evaluation Methods |
|---------------------------|------------|----------------------------|
| Effectiveness of Teaching | Students | Indirect Assessment |
| CLOs achievement | Faculty | Direct/Indirect Assessment |
| Learning Resources | Students | Indirect Assessment |
| Course Contents | Students | Indirect Assessment |

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

| | |
|---------------------|--------------------|
| Council / Committee | Department Council |
| Reference No. | 1/34/9767 |
| Date | 25/02/1441 H |