

**DFTG 2306 – Machine Design**

Course ID: 76911 – Fall 2015

Stafford Campus – Room N114 | 6:00 - 10:00 pm | TR

2 hour lecture – 4 hour lab for 16 weeks

**Instructor:** Kris Asper

**Instructor Contact Information**:

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**COURSE DESCRIPTION:**

Theory and practice of design project in problem solving, including press fit, bolted and welded joints, and transmission components.

**PREREQUISITE:**

DTFG 1305, DFTG1309, DFTG 2319, DFTG 2302, or Department Approval.

**TEXT**:

Machin Element in Mechanical Design

Authors: Robert Mott

**MATERIALS REQUIRED**:

16 GIG or larger flash drive, note book, and model building materials.

**KNOWLDGE**:

1. Machine design process
2. Manufacturing process
3. Mechanical components and mechanism

**COURSE OBJECTIVES:**

Upon completion of the course, the student should be able to:

1. Design simple mechanical components from given engineering data.
2. Calculate applied loads to components for design selection from vendor catalogs.
3. Completely document mechanical project.

**COURSE CURRICULUM STATEMENT:**

Advance techniques in the creation of 3D drawings

Create and use of Templates

Create drawing annotation and dimensioning.

Apply Geometric dimension and tolerance.

Investigate parent child relationship.

Run finite analyses to resolve failure in the design.

Explore sustainability in design and construction of a model.

Use the additive or subtractive manufacturing process.

**GRADING**

Exams and assignments will be given during the semester that will determine how successful you are at mastering the course material and basic skills. If you are having limited success at mastering the course material, contact the instructor for assistance.

**Grading Percentage**

Assignments 50% of the final grade

Mid-term 25% of the final grade

Final exam 25% of the final grade

Instructor may schedule more tests if desired.

Class and laboratory attendance, active participation in class, professional attitude and growth in terms of technical skills development and teamwork within the laboratory environment shall be taken in to consideration.

**STUDENT ASSIGNMENTS**

Project will assigned to each student to enhance the learning of any parametric software. The project will stress the basic skills that a student must have to gain proficiency in the use of the drawing software. The project will enhance the student ability to produce a clear and accurate drawing.

**Instructional Methods:**

As a professor, I will emphasize on:

1. Work in an engineering environment
2. Pay attention to detail
3. Meet project schedule
4. Exhibit patient and accept constructive criticism

In order to become proficient in the use of the drafting software, a student must read the text book and complete the exercises in a timely manner. Student should do the on line evaluation.

**GRADING**

Assignments will be given during the semester that will determine how successful you are at mastering the course material and basic skills. If you are having limited success at mastering the course material, contact the instructor for assistance.

**Grading Scale**

90-100 A

80-89 B

70-79 C

60-69 D

Below 59 F

**AMERICANS WITH DISABILITIES ACT (ADA) COMPLIANCE**

Any student with a documented disability (e.g. physical, learning, psychiatric, vision, hearing, ect) who needs to arrange reasonable accommodations must contact the Disability Support Services Office (DSSO) of their respective college at the beginning of each semester.Faculty is authorized to provide only the accommodation(s) requested by the DSSO. For information and services at HCC Southwest, contact: **DR. Becky Hauri, ADA Counselor, at 713.718.7910.**

**CLASS ATTENDANCE:**

You are expected to attend all lecture classes and labs. You are also responsible for all materials covered in either lecture or lab. In the case of your absence, you must contact the instructor to obtain make-up assignments or arrange make-up testing, either of which can be distributed at the instructor's discretion. Class attendance is checked daily.

The instructor has the authority to drop you from the class for excessive absences, that is, you may be dropped from a course after accumulating absences in excess of 12.5 percent of the total hours of instruction (lecture and lab).

For example:

A 3-credit hour lecture class meeting 3 hours per week - 2 absences (6 hrs.) is 12.5% of the class.

A 3-credit hour lecture/lab class meeting six hours per week - 2 absences (12 hrs.) is 12.5% of the class.

Administrative drops are at the discretion of the instructor. It is your responsibility to drop a course, should you choose not to complete it. Failure to withdraw officially will result in you receiving a grade off" in the course.

**Note**: Although it is your responsibility to officially withdraw from a course, it is always a good idea to discuss any attendance problems with your instructor first. Class attendance is very important, but your instructor may be able to help you catch up. If you become ill or know you are going to miss class for some reason, tell your instructor as soon as possible.

Departments and programs governed by accreditation or certification standards may have different attendance policies.

**SCHOLASTIC DISHONESTY:**

Students are responsible for conducting themselves with honor and integrity in fulfilling course require­ments. College System Officials may initiate penalties and/or disciplinary proceedings against a student accused of scholastic dishonesty. "Scholastic dishonesty" includes, but is not limited to, cheating on a test, plagiarism, and collusion.

"**Cheating**" on a test includes:

* Copying from another student's test paper;
* Using materials during a test that are not authorized by the person giving the test;
* Collaborating with another student during a test without authority;
* Knowingly using, buying, selling, stealing, transporting, or soliciting in whole or part the contents of an un-administered test;
* Bribing another person to obtain a test that is to be administered.

**"Plagiarism"** means the misuse of another's work and the deliberate incorporation of that work into work you offer for credit. "Collusion" means the unauthorized collaboration with another person in preparing work offered for credit.

Determination of scholastic dishonesty will be at the discretion of the instructor.

Reference the following web link for additional information: <http://www.hccs.cc.tx.us/handbookiStudentP.htm>

**Discrimination**

Students should be aware that discrimination and/or other harassment based on race, sex, gender identity and gender expression, national origin, religion, age, disability, sexual orientation, color or veteran status is prohibited by HCC Policy G.1 Discrimination and Harassment and D.1.1 Equal Educational Opportunities. Any student who feels they have been discriminated against or harassed on the basis of race, sex, gender identity, gender expression, national origin, religion, age, disability, sexual orientation, color or veteran status including sexual harassment, has the opportunity to seek informal or formal resolution of the matter. All complaints/concerns should be directed to the Office of Institutional Equity, 713 718-8271 or [oie@hccs.edu](https://webmail.hccs.edu/owa/redir.aspx?C=DURc0HUK-USwt1yi4nUWHmBKhBb1stIIu_SxjutRYji7RlhHtBDwhaLShpCpxXQ5dsJqygMwPrk.&URL=mailto%3aoie%40hccs.edu). Additional information may be obtained online. Visit [http://www.hccs.edu/district/departments/institutionalequity/](https://webmail.hccs.edu/owa/redir.aspx?C=DURc0HUK-USwt1yi4nUWHmBKhBb1stIIu_SxjutRYji7RlhHtBDwhaLShpCpxXQ5dsJqygMwPrk.&URL=http%3a%2f%2fwww.hccs.edu%2fdistrict%2fdepartments%2finstitutionalequity%2f)

Complaints involving sexual misconduct to include but not limited to: sexual assault, stalking, dating violence, sexual harassment or domestic violence should be directed to the HCC Title IX Coordinator, Renée Mack at 713 718-8272 or [renee.mack@hccs.edu](https://webmail.hccs.edu/owa/redir.aspx?C=DURc0HUK-USwt1yi4nUWHmBKhBb1stIIu_SxjutRYji7RlhHtBDwhaLShpCpxXQ5dsJqygMwPrk.&URL=mailto%3arenee.mack%40hccs.edu)

**Course Schedule**

**Machine Design**

**DFTG 2306**

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| **Week 1** Unit 1 Design Concept  Introduction to the mechanical engineering design process   * Elements of the design process * Design and production of individual components * Assembly considerations   Permanent and semi-permanent attachments  Economic factors  Emphasis is placed on the general concepts and methodologies of a structured engineering approach to design and on the impact of the assembly process on design, manufacturing and cost.  At the end of this unit the student should be able to:   1. Understand the various steps in the design and manufacturing of a project 2. Identify the different types of engineering drawing used in each phase of the design and manufacturing process. 3. Understand the fundamental requirements of a successful design 4. Identify and create various engineering documents 5. Create and Design Layout Drawings from engineering specifications and notes 6. Use vendor catalogs, standard and reference books found in a typical drafting room 7. Organize and maintain an engineering design notebook |
| **Week 2** Unit 2: Manufacturing Materials and Process  The student is introduced to manufacturing materials and methods including machining processes  At the end of this unit the student should be able to:   1. Identify the common types of manufacturing materials 2. Identify the classification bodies for steel products 3. Understand the numbering system for steel products 4. Understand the typical shop process of machining, casting and forging 5. From a set of specifications, select materials and create a casting drawing and final machining drawing 6. Design and draw the representation of various machined features 7. Discuss the statistical process quality control assurance system |
| **Week 3** Unit 3: Bearing and Seals  Introduces the student to the use of bearings, and seals. It covers when these devices are used in a design and how the components are selected, specified and drawn  At the end of this unit the student should be able to:   1. Understand the function and use of bearings, couplings and seals 2. Identify the various types of bearings 3. Calculate bearing loads 4. Produce load and reaction diagrams 5. Make bearing selections from vendor catalogs 6. Design a bearing housing |
| **Week 4** Unit 4: Shaft/Keys/Couplings  This unit introduces the student to many uses of shaft, keys, and couplings in machine design  At the end of this unit the student should be able to:   1. Calculate loads placed on shafts for sizing and material selection 2. Produce load and reaction diagrams 3. Design a shaft and key from given data |
| **Week 5** Unit 5: Gears and Cams  This unit introduces the student to the use and design of gears  At the end of this unit the student should be able to:   1. Define the different types of gears used 2. Understand the basic working principle of gears and cams 3. Design a gear train from given data 4. Produce individual gear drawings 5. Produce a cam displacement diagram |
| **Week** 6 Unit 6: Four-bar linkage and Sliders  This unit introduces the student to the use and design of four-bar linkages and sliders  At the end of this unit the student should be able to:   1. Understand the different practiced linkage arrangements used in machine design 2. Produce a linkage schematic using ANSI symbols 3. Calculate and analyze the extreme left and right motion limits of mechanisms 4. Design a mechanical linkage from given data |
| **Week 7** Unit7: Belt and Chain Drives  At the end of this unit the student should be able to:   1. Design a belt drive system using vendor specifications 2. Design a chain drive system from vendor specifications |
| **Week 8 Mid Term Examination** |
| **Week 9** Unit 8: Hydraulic Systems  This unit introduces the student the use and application of fluid power to mechanical devices  At the end of this unit the student should be able to:   1. Understand the function of the typical components use in a n air system circuit 2. Draw graphic diagram of hydraulic circuits 3. Develop fluid power systems from engineering sketches and component lists |
| **Week 10** Unit 9: Air System  This unit introduces the student the use and application of air systems to mechanical devices  At the end of this unit the student should be able to:   1. Understand the function of the typical components use in a n air system circuit 2. Draw graphic diagram of hydraulic circuits 3. Develop fluid power systems from engineering sketches and component lists |
| **Week 11** Unit 10: Pattern Layout  This unit introduces the student to sheet-metal layout and development and development for mechanical chassis and housing  At the end of this unit the student should be able to:   1. Determine pattern layouts using applied geometric method, such as true length and size theory 2. Calculate overall material sizes 3. Produce a sheet-metal working drawing from a container or housing |
| **Week 12**  Unit 12: Geometric Tolerance  This unit introduces the student to the application of geometric tolerances to mechanical components  At the end of this unit the student should be able to:   1. Understand the various terms and symbols used in geometric tolerances 2. Apply geometric tolerances to drawings |

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| **Week 13-15** Unit 11: Special Design project  This unit gives to the use of all the graphical techniques used in the development of an original solution to a mechanical design problem. From a list of several proposed problems, the student must do research, prepare a design proposal and layout and produce working detail drawings and assembly drawings with bill of material list |
| **Week 16 Final Examination** |