# JEFFERSON COLLEGE

## COURSE SYLLABUS

**EGR101**

**COMPUTER-AIDED ENGINEERING DESIGN**

3 Credit Hours

Prepared by:
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Revised By: Mr. Bob Brazzle
November 2015

Minor Revision or Update by: Fran Moore
Per Curriculum Committee Process Change: April 25, 2018

Ms. Linda Abernathy, Division Chair, Math, Science, & Business
Ms. Shirley Davenport, Dean, Arts & Science Education

**EGR101 Computer-Aided Engineering Design**

I. CATALOG DESCRIPTION

A. Prerequisites:
- High school geometry
- Reading proficiency

B. 3 semester credit hours

C. Computer-aided Engineering Design is the first course taken by pre-engineering students, and introduces principles and processes of engineering design and relevant software for these processes. Students are expected to apply these processes and software in a significant project inspired by an authentic engineering design problem. Laboratory time is required. This course is required for the Associate of Science degree. (F, S)

D. Curricular alignment:
- Elective course applies toward AA degree.
- Fulfills AS degree requirement

II. EXPECTED LEARNING OUTCOMES/CORRESPONDING ASSESSMENT MEASURES

| Expected Learning Outcomes | Assessment Measures |
|---|---|
| Use a systematic approach to engineering design and apply this approach in several projects of increasing complexity in a collaborative team environment | Classroom discussions, one-on-one observations and evaluation of formal project write-ups and presentations |
| Become proficient with Microsoft Office Suite software and create documents which seamlessly integrate these | One-on-one observations and formal project write-ups and presentations |
| Gain experience with AutoDesk software (AutoCAD and Inventor) and use these to create 2-D and 3-D drawings | Classroom discussions, one-on-one observations and evaluation of formal project write-ups and presentations |
| Use the MakerBot interface to create 3-D printed prototypes for the design projects | Evaluation of the prototypes against a set of design criteria |
| Use appropriate software to control a Programmable Logic Circuit in support of the main design project | Classroom discussions, one-on-one observations and evaluation of formal project write-ups and presentations |

III. OUTLINE OF TOPICS

A. Introductory design project
1. Using a Gantt chart to assign responsibilities and organize design tasks
2. Concept of constraints and criteria for success
3. Introduction to Microsoft Excel including its use in creating a Gantt chart

4. Introduction to Microsoft Word including its basic drawing tools
5. Project evaluation: description with sketch and Gantt chart

B. Intermediate design project: conceptual design
1. Team dynamics, development of team identity and team logo
2. Develop an objectives tree using Microsoft PowerPoint tools
3. Develop a functional model using CMAP or Prezi freeware

C. Intermediate design project: Concept development
1. Morphological matrix, Pugh chart and decision matrix
2. Advanced Microsoft Office tools and functions.
3. Project evaluation: seamless integration of software tools
4. Summary of formal design methods and software tools

D. Main design project: Planning and concept development
1. Introduction to the design problem of the main project
2. Development of team identity and team logo
3. AutoCAD module 1: Drawing basic shapes
4. AutoCAD module 2: Functions for editing 2-D drawings
5. AutoCAD module 3: Dimensions and tolerances
6. AutoCAD module 4: Parametric drawing and final touches
7. Deliverable: Preliminary design review

E. Main design project: Proof of concept and prototyping
1. Introduction to AutoDesk Inventor; integration with AutoCAD
2. 3-D design using AutoDesk Inventor
3. Introduction to MakerBot software and 3-D printing
4. Introduction to the Arduino and programmable logic circuits (PLC)
5. Deliverables: Alpha and beta prototypes for main project
6. Deliverables: Critical design review document

F. Main design project: Final testing and production
1. Testing protocols and learning from engineering failures
2. Engineering ethics
3. Integration of PLC and 3-D printed design
4. Deliverables: Final paper and presentation of project design

## IV. METHODS OF INSTRUCTION

A. Lecture

B. Classroom discussion

C. Homework

D. Laboratories

## V. REQUIRED TEXTBOOK

Nigel Cross; Engineering Design Methods (current edition). New Jersey: Wiley Publishing.

VI. REQUIRED MATERIALS

Arduino with sensor pack

VII. SUPPLEMENTAL REFERENCES

None

VIII. METHODS OF EVALUATION

A. One-on-one evaluations of software mastery

B. Required homework

C. Project write-ups and presentations

IX. ADA AA STATEMENT

Any student requiring special accommodations should inform the instructor and the Coordinator of Disability Support Services (TC 101; phone 636-481-3169).

X. ACADEMIC HONESTY STATEMENT

All students are responsible for complying with campus policies as stated in the Student Handbook (see College website, http://www.jeffco.edu).

XI. ATTENDANCE STATEMENT

Regular and punctual attendance is expected of all students. Any one of these four options may result in the student being removed from the class and an administrative withdrawal being processed: (1) Student fails to begin class; (2) Student ceases participation for at least two consecutive weeks; (3) Student misses 15 percent or more of the coursework; and/or (4) Student misses 15 percent or more of the course as defined by the instructor. Students earn their financial aid by regularly attending and actively participating in their coursework. If a student does not actively participate, he/she may have to return financial aid funds. Consult the College Catalog or a Student Financial Services representative for more details.

XII. OUTSIDE OF CLASS ACADEMICALLY RELATED ACTIVITIES

The U.S. Department of Education mandates that students be made aware of expectations regarding coursework to be completed outside the classroom. Students are expected to spend substantial time outside of class meetings engaging in academically related activities such as reading, studying, and completing assignments. Specifically, time spent on academically related activities outside of class combined with time spent in class meetings is expected to be a minimum of 37.5 hours over the duration of the term for each credit hour.