

# DAKOTA HIGH SCHOOL

## RESEARCH and DEVELOPMENT – COURSE SYLLABUS

**Instructor:** Mr. Scott E. Mitchell  
**Email:** smitchell@cvs.k12.mi.us  
**Website:** www.dakotadesigntech.com  
**Classroom #:** 163

**Office Hours:** 2:30 – 3:00  
**Planning Room:** 160  
**Telephone Number:** (586) 723-2856

**Length:** 2 Hours - 1 Year

**Credits:** 2.0

**Text:** Technical Drawing, 13<sup>th</sup> Edition, Giesecke and Mitchell  
Jig and Fixture Design, 4<sup>th</sup> Edition, Edward Hoffman  
Machinery's Handbook, 26<sup>th</sup> Edition, Erik Oberg and Franklin D. Jones

**Software:** AutoCAD 2019, Inventor 2019, SolidWorks 2015 and MS Office Products

### **COURSE DESCRIPTION**

In this fourth year course students will have the opportunity to design and develop a variety of new products and mechanisms using the latest in engineering design techniques. With concept sketching and visualization as a foundation, projects will be designed, engineered, prototyped, fabricated and tested for performance and durability. Students will focus on 3-D solid part design and analysis using the CAD system. Results from the applications of various digital electronic media may include; Photo-Realistic Rendering, Animation, Finite Element Analysis (FEA) and Plastic Rapid Prototyping of 3-D solids. Special emphasis is placed on the Research and Development of fully defined new products. Students will use all essential metal and woodworking tools in the DHS fabrication lab to manufacture and assemble their final projects. Students will be required to give a final portfolio presentation of their research and will depart the class with a greater understanding of the development of tangible industry processes, methods, new product development and equipment.

### **METHODOLOGY**

The course includes lectures, discussions and laboratory sessions. Assignments in general knowledge, projects and drawings are to be worked on independently or cooperatively, as assigned. Students will make extensive use of the CAD and Fabrication labs to complete their assignments.

### **PREREQUISITES**

Successful completion of Engineering Design 1A/1B with three or more years of AutoCAD and Inventor experience and/or instructors approval.

### **CURRICULUM OUTLINE**

- Proposal Sketching
- Design Process
- Safety
- Prototyping
- Power / Hand Tools
- Precision Measuring
- Reference Materials
- Jig and/or Fixture Building
- Challenge Projects
- Professional Research
- Advanced AutoCAD
- Product Development
- Model Building
- Inventions
- Final Presentation

### **SUPPLIES FOR CLASS** (provided by instructor)

- 1 ½" Black three ring, clear view binder with dividers.
- Mechanical Series Pencils - .7mm
- Flash Drive (recommended but not provided)

### **PROJECT FEES / ASSOCIATED COSTS**

Students are not charged lab fees associated with projects as all materials and supplies are normally funded by the CTE department of Chippewa Valley Schools. Students may incur additional costs for specific projects that go above and beyond the standard scope of the original project. These costs apply if they choose to pursue fabrication capabilities or parts supplies outside of the fabrication lab.

## **EVALUATION and ASSESSMENT**

Students will be evaluated and assessed by: written testing, oral presentations, demonstrations, participation, and hands-on performance (drawing on the computer). Students will also give a self-evaluation.

### **GRADING SCALE**

A	100 -95	B-	83 - 80	D+	69 - 67
A-	94 - 90	C+	79 - 77	D	66 - 64
B+	89 - 87	C	76 - 74	D-	63 - 60
B	86 - 84	C-	73 - 70	F	59 & Below

- **Extra Credit Policy:**
  - If original credit is complete then extra credit will be provided. 10% of the total points available is the maximum allotted extra credit.
- **Homework Policy:**
  - Lab work, in-class work and appropriate in-class time is supplied for assignments due to the nature of curriculum delivery. All "home" work assigned will have fully defined due dates and criteria.
- **Late Work Policy:**
  - All late work will be penalized 20% per day late. No work will be accepted after 5 days.
- **Reassessment Policy:**
  - Daily lab assignments develop mastery of knowledge and may be resubmitted for grade improvement. Actual assessments or project based learning assessments are singular events.
- **Testing Reference Material:**
  - All student resources may be available for test taking, such as; binder portfolios, notes, prior work, industry reference materials.

### **ACADEMIC INTEGRITY POLICY**

The primary rule in this professional class is **RESPECT**. It applies to all aspects of the class. If you are wondering if something is allowed or will be tolerated ask yourself where the word respect is involved in the action. Remember, this class is a privilege - not a requirement.

**The following actions will not be tolerated whatsoever and will be cause for permanent removal with a failing grade from this design technology program. These rules and guidelines are in addition to the school handbook and district policies.**

- **Cheating / Academic dishonesty in any form.**
  - Examples:
    - Taking someone else's work and using it for your own / sharing your work.
    - Copying or allowing copying of CAD files / Drawings.
    - Tampering with someone's project or work.
    - Deleting files from other student's directory.
- **Destruction of lab equipment of any form.**
  - Examples:
    - Cutting or damaging the workstation surface.
    - Damaging the PC and any of its components.
    - The damage, removal / disassembly of any part of the lab furniture, or any part of the PC and its components including wires and cables.

**Unauthorized** Internet usage could result in **permanent removal of computer privileges** in the lab. Internet usage will only be allowed upon instructor approval. **A failing grade in all CAD work will result without the use of a computer.**

**Unauthorized software** application use or installation will result in **permanent removal of computer privileges** in the lab. **A failing grade in all CAD work will result.**

**Unauthorized access** to the inner workings of the software of the PC system (**hacking**) or installing any software, changing the background of the desktop, changing the computer time or date, installing games, using the network for unauthorized communication or storage, or accessing the C: drive will result in **permanent removal of computer privileges** in the lab. **A failing grade in CAD work will result.**

## **ATTENDANCE**

Active attendance in the class is a valuable and integral part of the student's grade. Attendance in school is the responsibility of the student and his/her parents or guardian. Attendance has a bearing on academic achievement and will reflect in a student's grade. Excessive absence or tardiness, whether excused or unexcused, can result in a failing grade during the marking period or semester.

## **STATE OF MICHIGAN CTE SEGMENTS**

- Q – Beyond Completer

## **ARTICULATION COURSE CREDIT FOR POST-SECONDARY INSTITUTIONS**

The following schools offer course credit through an articulation agreement after successfully completion of the Design Technology Course Program. (CIP 15.1306) Each post-secondary school has detailed course requirements needed in order to earn credits in their specific program of study. (Similar to Advanced Placement credits)

- *Macomb Community College*
- *Oakland Community College*
- *Henry Ford Community College*
- *Davenport University*
- *Ferris State University*

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