

7730 INTERMEDIATE ENGINEERING DESIGN

DATE:

INDUSTRY SECTOR: Engineering and Architecture Sector

PATHWAY: Engineering Design

CALPADS TITLE: Intermediate Engineering Design (Concentrator)

CALPADS CODE: 7730

HOURS:

Total	Classroom	Laboratory/CC/CVE
180	90	90

JOB TITLE	O*NET CODE	JOB TITLE	O*NET CODE
Mechanical Engineers	17-2141.00	Architectural and Civil Drafters	17-3011.00
Drafters, All Other	17-3019.00	Industrial Engineers	17-2112.00
Engineers, All Other	17-2199.00	Manufacturing Engineers	17-2199.04

COURSE DESCRIPTION:

This concentrator course builds upon the Engineering and Architecture introduction course and provides students with additional concepts and experiences required for career readiness and to pursue further education in the Engineering Design career pathway. This concentrator course leads to the capstone course in the Engineering Design pathway's sequence of courses.

A-G APPROVAL: G

ARTICULATION: None

DUAL ENROLLMENT: None

PREREQUISITES:

Prerequisite
Introduction to Engineering and Architecture

METHODS OF INSTRUCTION

- Direct instruction
- Group and individual applied projects
- Multimedia
- Demonstration
- Field trips
- Guest speakers

STUDENT EVALUATION:

- Student projects
- Written work
- Exams
- Observation record of student performance
- Completion of assignment

INDUSTRY CERTIFICATION:

- None

RECOMMENDED TEXTS:

- Architecture Residential Drafting and Design by: Clois E. Kicklighter and W. Scott Thomas
- Technology Engineering & Design by: Sharon A. Brusic, James F. Fales, Vincent F. Kuetemey

PROGRAM OF STUDY

Grade	Fall	Spring	Year	Course Type	Course Name
9, 10, 11, 12				Introductory	Introduction to Engineering and Architecture
10, 11, 12				Concentrator	7730 Intermediate Engineering Design
11, 12				Capstone	Advanced Engineering Design

I.	INTRODUCTION, ASSESSMENT AND DESIGN REVIEW	CR	Lab/ CC	Standards
	A. Classroom Contract B. Students Questionnaire C. Multi-View Drawing Hands-On	5	0	Academic: LS: 11-12.1 G-CO: 12 G-GMD: 5 G-MG: 3 CTE Anchor: Career Planning and Management: 3.1, 3.2 Technology: 4.3 Technical Knowledge and Skills: 10.3 CTE Pathway: C1.2, C2.3, C3.1
II.	DEPARTING FROM STEREOTYPED IDEAS	CR	Lab/ CC	Standards
	A. Design and built quality into mechanisms. a. 24-Hour Journal Sketches and Activity B. Analytical Seeing, Cues to Form & Space and Strength of Materials a. Paper Clip Design b. 30 Circle 5-Minutes C. Engineering Design Process a. Ten Steps Overview b. Visual Design Principles and Elements Matrix c. Decision Matrix d. Gantt Chart D. Blending Ideas Sketching with Imagination a. Model Paper Airplane Design 1. Construction 2. Working Drawings (Hands-On) 3. Competition	10	10	Academic: RLST: 11-12.4 G-CO: 12 G-GMD: 5 G-MG: 3 CTE Anchor: Career Planning and Management: 3.3 Problem Solving and Critical Thinking: 5.3, 5.4 Responsibility and Flexibility: 7.5 Demonstration and Application: 11.5 CTE Pathway: C5.4, C5.2, C8.1, C10.4
III.	MECHANICAL DRAWINGS CAD	CR	Lab/ CC	Standards
	A. Autodesk Inventor or Solid Works a. Producing 3D Drawings of polyhedral, prisms, cylinders, pyramids, cones, spheres, torus and ellipsoids. 1. Solid Modeling 1. Shaft Set 2. Lift Guide 3. Saddle Support 2. Revolving and Mirror Commands 1. Flower Pot 2. Truck Wheel 3. Car Wheel	10	15	Academic: RLST: 11-12.4 WS: 11-12.6 G-CO: 13 G-MG: 3 CTE Anchor: Technical Knowledge and Skills: 10.2, 10.3 Demonstration and Application: 11.1, 11.5 CTE Pathway: C2.3, C4.2, C10.4

IV.	MECHANICAL WORKING DRAWINGS CAD	CR	Lab/ CC	Standards
	A. Ortographic Projections, Isometric View, Section, Auxiliary Views & Title Block Design a. Shaft Set b. Lift Guide c. Saddle Support	5	5	Academic: G-CO: 12, 13 G-GMD: 5 CTE Anchor: Technology: 4.3 Technical Knowledge and Skills: 10.1, 10.2, 10.3, 10.4 Demonstration and Application: 11.1 CTE Pathway: C3.3, C6.1, C7.1, C8.1, C8.2, C9.2, C10.1, C10.2, C10.3, C10.4
V.	ADVANCED SOLID MODEL	CR	Lab/ CC	Standards
	A. Reference Geometry, Axis, Point, Loft, Shell, Fillet, Circular Pattern and Convert Entities a. Ilder Arm b. Funnel c. Vaccum Nose	5	10	Academic: G-CO: 12, 13 G-MG: 3 CTE Anchor: Technical Knowledge and Skills: 10.1, 10.2, 10.3, 10.4 CTE Pathway: C10.4
VI.	MEASURING INSTRUMENTS	CR	Lab/ CC	Standards
	A. Scale, Calipers, Micrometers, Height Gage, Surface Table & Dimensioning and Tolerance. a. 10 Different Objects to be Measure up to (.001" & .0001") b. Metric Readings up to (.0002 of a Meter)	5	10	Academic: N-Q: 1, 2, 3 CTE Anchor: Technical Knowledge and Skills: 10.1 Demonstration and Application: 11.1, 11.2 CTE Pathway: C2.1, C2.2, C4.1, C4.2
VII.	ASSEMBLY DRAWINGS AND MODELING COMPONENTS	CR	Lab/ CC	Standards
	A. Concepts and skills used in measuring, proportioning and applied geometry. B. Structure into form and Design C. Mates, Linear Component Pattern, Tolarence and Interference. a. Close Quarter Screw Design 1. Rod 2. Rivet 3. Handle b. Mini Vise 1. Block Cast Iron 2. Bushing A & B 3. Screw M14 X 2	20	10	Academic: RSIT: 11-12.7 A-CED: 3 CTE Anchor: Technical Knowledge and Skills: 10.1, 10.2 CTE Pathway: C1.1, C1.2, C2.1, C3.1, C11.1, C11.2

	4. Handle 5. Pin			
VIII.	INTRO TO ANIMATION AUTODESK 3D STUDIO MAX	CR	Lab/ CC	Standards
	A. Creating a Product Animation Presentation a. Parts interference and relationships b. Camara Path c. Lighting d. Materials Library e. Rendering f. Selling Your Design	5	10	Academic: SEP: 2, 4, 7, 8 CTE Anchor: Demonstration and Application: 11.1, 11.5 CTE Pathway: C5.3, C11.1, C11.2
IX.	DESIGN TABLE AND VARIABLES IN A DRAWING	CR	Lab/ CC	Standards
	A. Model Configuration Excel Sheet a. Table Design Drawing Handout	5	5	Academic: F-IF: 1 CTE Anchor: Technology: 4.4 CTE Pathway: C8.2, C9.1
X.	MODEL HOUSE TEAM DESIGN PROJECT	CR	Lab/ CC	Standards
	A. CAD Drawings a. Floor Plan b. Elevations c. Site Plan d. Roof Design B. Physical Model C. Architectural Model Construction Using Balsa Wood and Illustratiion Board D. Presentations	15	10	Academic: WHSST: 11-12.7 G-CO: 12 G-MG: 3 G-SRT: 1b, 1 CTE Anchor: Demonstration and Application: 11.5 CTE Pathway: C10.2, C10.3, C10.4
XI.	BRIDGE DESIGN TEAM PROJECT	CR	Lab/ CC	Standards
	A. Library Structure Research B. Five Mechanical Forces C. Introduction to Compression and Tension D. CAD Drawings a. Front & West Elevation b. Scale Factor E. Physical Model F. Model Construction Using Popsicles Sticks G. Presentations	5	5	Academic: WS: 11-12.8 ETS: ETS1.A, ETS1.B, ETS1.C, ETS1 CTE Anchor: Ethics and Legal Responsibilities: 8.7 Leadership and Teamwork: 9.1, 9.2, 9.3, 9.6, 9.7 Demonstration and Application: 11.1 CTE Pathway: C2.1, C11.2

Entered by:

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