

CMU Assessment Plan Template

Program Bachelor of Science, Major in Vehicle Design

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Department(s) or Interdisciplinary Council Responsible for the Program ProfEd

Five-Year Implementation Dates 2004-05 to 2009-10

1. Student Learning Outcomes for the program. List the Student Learning Outcomes in each of the domains that apply to the program.

This program is designed to provide knowledge and skills for individuals to function effectively in positions of leadership or teaching in the adult education environment. This is not a certification program for teachers or administrators, but may be utilized for professional advancement.

Graduates of this program will be able to:

Goal 1: Projection Systems and Design Concepts – Graduates will be able to utilize the principles of projection procedures and techniques used in 2-D and 3-D computer-aided vehicle design (CAD) activities.

Objective A: Graduates of the Vehicle Design program will demonstrate visualization/projection procedures via using various CAD systems.

Outcome 1: Demonstrate concepts of first-angle, third angle, descriptive geometry methods, pictorials, sections, sketching, geometric construction, fasteners, materials, processes, dimensioning, tolerancing, and design and working drawings.

Outcome 2: Use of technical graphics/terminology to communicate design concepts and principles; develop an understanding of the design process, demonstrate the ability to work in a team environment.

Objective B: Graduates of the Vehicle Design program will demonstrate the use of 2-D CAD software for the documentation of design outcomes, and to use 3-D CAD software in preparation of models used in the design process and “down stream” applications.

Outcome 1: Use representative CAD applications software (i.e. solid modeling, surface modeling, documentation analysis and manufacturing methods),

Outcome 2: Use basic math models/algorithms associated with wireframe surface, and solid models/geometry.

Goal 2: Terminology and Design Concepts – Graduates will state the terminology, and demonstrate associated concepts and principles of design related to various aspects of vehicle layout and modeling development.

Objective A: Graduates of the Vehicle Design program will utilize appropriate terminology during development of the modern vehicle (i.e. automobile, truck, etc.).

Outcome 1: Design systems and components related to vehicle design (i.e. materials and processes; engines; drive trains, chassis, electrical; fuels, emissions, and exhaust systems; heating, ventilation, and air conditioning (HVAC); bodies; noise, vibration, handling, and drivability.

Outcome 2: State the individual design characteristics of each material, process, and vehicle subsystem.

Objective B: Graduates of the Vehicle Design program will conceptually break the vehicle into related systems and subsystems and indicate the individual design characteristics of each system and subsystem, and understand their functional interdependency.

Outcome 1: State vehicle system and component relationships from a functional and design perspective.

Outcome 2: Break a system down into related subsystems until the basic building blocks of each system, the design component, is left with its functional requirements.

Goal 3: Vehicle Design/Manufacturing Systems and Concepts – *Graduates will state how the overall systems interconnect during vehicle design and manufacturing.*

Objective A: Graduates of the Vehicle Design program will state how vehicle manufacturing processes.

Outcome 1: Application of appropriate vehicle related materials and the associated processing.

Outcome 2: Application of design for manufacturing and assembly principles.

Outcome 3: Application of vehicle related metal forming/shaping methods.

Outcome 4: Application of vehicle manufacturing process planning methods.

Outcome 5: Application of vehicle related manufacturing tooling methods.

Outcome 6: Application of vehicle related plastics technology.

Objective B: Graduates of the Vehicle Design program will demonstrate how vehicles are designed.

Outcome 1: Demonstrate how to perform vehicle body detailing.

Outcome 2: Demonstrate how to perform vehicle body layout.

Outcome 3: Application of vehicle packaging methods.

Outcome 4: Application of value engineering methods.

Outcome 5: Demonstrate size tolerancing and allowance determination methods.

Outcome 6: Demonstrate geometric dimensioning and tolerancing (GD & T) methods.

Goal 4: Integration of Design Concepts – *Graduates will develop individual and team-based skills related to understanding the integrative nature of the concepts related to the design, assembly, manufacturing, and servicing of a vehicle.*

Objective A: Graduates of the Vehicle Design program will analyze, synthesize, and evaluate vehicle design development outcomes.

Outcome 1: Plan, document, and report a design application to include issues related to assembly, manufacturing, and servicing.

Outcome 2: Associate various vehicle related materials with appropriate manufacturing methods.

Outcome 3: Function successfully within a team culture to integrate the various stages of vehicle development.

Objective B: Graduates of the Vehicle Design program will demonstrate team-based approaches to selection of design outcomes, assembly methods, manufacturing processes, and servicing procedures for vehicle optimization.

Outcome 1: Use multiple decision making tools/systems in order to determine the “best choice” solution to a design problem.

Outcome 2: Develop written and oral reports dealing with a major vehicle design application project.

Outcome 3: Function successfully within a team culture in order to optimize an assembly and/or component design.

Goal 5: Professional Competencies – *Graduates will demonstrate professional competencies needed for a career in vehicle design.*

Objective A: Graduates of the Vehicle Design program will demonstrate professional practices.

Outcome 1: State professional and environmental ethics and practices.

Outcome 2: Identify professional behaviors in the workplace.

Outcome 3: Indicate the importance of professional associations in the organization/profession.

Outcome 4: State the importance of intellectual diversity in the organization.

Objective B: Graduates of the Vehicle Design program will demonstrate communication and presentation skills both orally and in writing through the use of vehicle design related technology.

Outcome 1: Demonstrate strong verbal presentation and communication skills.

Outcome 2: Demonstrate written communication skills.

Outcome 3: Demonstrate technical writing skills (i.e. memoranda, business letters, electronic).

2. Curriculum Alignment of Student Learning Outcomes. Where is the information introduced, emphasized, and/or reinforced in the courses required in the program? Use the format below to list the program Outcomes and the Required Courses. Fill in each cell with either an 'I' where the outcome is *introduced*, an 'E' where the outcome is *emphasized*, and/or an 'R' where the information is *reinforced*.

See following pages

Program Student Learning Outcomes	REQUIRED COURSES									
	MTH 107	PHY 130	IET 154	IET 354	IET 451	IET 359	TEC 320	TEC 321	TEC 323	TEC 325
1.A.1	I, R	I, R	I	I, E	I, E, R	E, R	R			
1.A.2			I	I, E			R			
1.B.1	I, R	I, R	I	I, E	R	E, R	R			
1.B.2	I, R	I, R	I	I, E		R				
2.A.1							I, R			
2.A.2							I, R		I, E	
2.B.1							I			
2.B.2										
3.A.1							I, R			I, E
3.A.2							I, R			I, E
3.A.3							I, R			I, E
3.A.4							I, R			I, E
3.A.5							I, R			I
3.A.6									I	
3.B.1										
3.B.2										
3.B.3										
3.B.4										R
3.B.5					E, R					
3.B.6					E, R					
4.A.1									I, E	I, E
4.A.2								E, R		R
4.A.3								I, E		I, E
4.B.1	I, R	I, R						I, E	I, E	I
4.B.2									E, R	I, E
4.B.3									E, R	I, E
5.A.1								I, E		
5.A.2								I, E		
5.A.3								I		
5.A.4								I		
5.B.1								I	E	
5.B.2								I	E	R
5.B.3									E	R

I = Introduced E = Emphasized R = Reinforced

Program Student Learning Outcomes	REQUIRED COURSES									
	TEC 350	TEC 459	TEC 420	TEC 441	TEC 442	TEC 443	TEC 457	IET 365	IET 455	IET 459
1.A.1				R	R		R		R	
1.A.2	R			R	R		R		R	E, R
1.B.1				R					R	E, R
1.B.2	R			R					R	E, R
2.A.1	R	R	R			E, R	E, R			
2.A.2	R	R	R			R	E, R	I, E		
2.B.1	R	R	R	E, R		R	E, R			
2.B.2	R	R	R	E, R		R	E, R			
3.A.1		R	R	R	E, R		E, R			
3.A.2		R	R	R	E, R		E, R		E, R	
3.A.3		R	R	E, R	E, R		R		E, R	
3.A.4		E, R	R		E, R		E, R			
3.A.5		R	R		R		R		E, R	
3.A.6				E, R	E, R		E, R	I, E		
3.B.1				E, R	E, R		R			
3.B.2				E, R	R		R			
3.B.3	I, E	R		E, R	E, R	E, R				
3.B.4		E, R	I, E, R	R	R	E, R				
3.B.5							R		R	
3.B.6							R		R	
4.A.1		E, R	R	E, R		R			R	
4.A.2		R	R			R			R	
4.A.3	I, E	E, R	E, R	E, R		E, R			R	
4.B.1	I, E	E, R	E, R	E, R		E, R			R	E, R
4.B.2	E	E, R	E, R	E, R		E, R				
4.B.3	E	E, R	E, R	E, R		E, R			R	
5.A.1	I, E			I, E		R		I, E		
5.A.2										
5.A.3						R				
5.A.4										
5.B.1	E, R	R	E, R	R	R	R	R			
5.B.2	E, R	R	E, R	R	R	R	R	R		
5.B.3	E, R	R	E, R	R	R	R	R	R		

I = Introduced E = Emphasized R = Reinforced

Program Student Learning Outcomes	REQUIRED COURSES							
	TEC 376	IET 225	TEC 444	TEC 451	TEC 452	TEC 454	TEC 456	IET 457
1.A.1			R	R	R		R	E, R
1.A.2			R	R	R		R	R
1.B.1					R	R	R	I, E
1.B.2			R	R	R	R	R	E, R
2.A.1						E, R	E, R	
2.A.2			E, R	E, R	E, R	E, R	E, R	
2.B.1			E, R	E, R	E, R	E, R	E, R	
2.B.2			E, R	E, R	E, R	E, R	E, R	
3.A.1	E, R	E	R	R	R	E, R	E, R	
3.A.2	E, R	E	R	R	R	R	R	
3.A.3	E, R	E			E, R	R	R	
3.A.4		E			R	R	R	
3.A.5	E, R	E			R	R	R	
3.A.6		E				E, R	E	
3.B.1			R	R	E, R	R	R	
3.B.2			R	R	R	R	R	
3.B.3			R	R	R	E, R	E, R	
3.B.4								
3.B.5	E, R					R	R	
3.B.6	E, R					R	R	
4.A.1	E, R		R	R		E, R	E, R	
4.A.2	E, R					R	R	
4.A.3	R		R	R	E, R	E, R	E, R	
4.B.1	R		E, R	E, R	E, R	E, R	E, R	
4.B.2	R		R	R	E, R	E, R	E, R	
4.B.3	R		R	R	E, R	E, R	E, R	
5.A.1								
5.A.2								
5.A.3					R	R	R	
5.A.4								
5.B.1	R		R	R	R	R	R	
5.B.2	R		R	R	R	R	R	
5.B.3	R		R	R	R	R	R	

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3. Evidence/Artifacts used to assess Student Learning Outcomes over the 5 year period of this Plan. What instruments will be used in each of the five years? When and where will they be administered in each of the five years? Which Student Learning Outcomes will be assessed during each of the 5 years? How will results be reported (e.g. percentages, ranks, state or national comparisons) for each of the 5 years?

Outcomes to be Assessed each Year	Instruments to be used each Year	Expected Measures from the Instruments	Academic Year
All	Alumni Survey (Strategy 1) – Supporting Measure	Data Analysis – Alumni Responses per Outcome Statistics	2004 - 2005
All	Standardized Exit Exam (Strategy 2) – Scored by rubric/Direct Measure Capstone Reports (Strategy 3) – Evaluated with scoring rubric/Supporting Measure	Total points on rubric; Data analysis Total points on rubric; Data analysis	2005 - 2006
All	Alumni Survey (Strategy 1) – Supporting Measure	Data Analysis – Alumni Responses per Outcome Statistics	2006 - 2007
All	Standardized Exit Exam (Strategy 2) – Scored by rubric/Direct Measure Capstone Reports (Strategy 3) – Evaluated with scoring rubric/Supporting Measure	Total points on rubric; Data analysis Total points on rubric; Data analysis	2007 - 2008
All	Alumni Survey (Strategy 1)	Data Analysis – Alumni Responses per Outcome Statistics	2008 - 2009
All	Standardized Exit Exam (Strategy 2) – Scored by rubric/Direct Measure Capstone Reports (Strategy 3) – Evaluated with scoring rubric/Supporting Measure	Total points on rubric; Data analysis Total points on rubric; Data analysis	2009 - 2010

4. Dissemination of Information over the 5 year period of this Plan. When, where, and how will results be disseminated to stakeholders in each of the 5 years?

Expected Measures from the Instruments	Affected Stakeholders	Dates and Locations for Dissemination of results
2004 – 2005 Alumni Survey: Data Analysis – Alumni Responses per Outcome Statistics	<ul style="list-style-type: none"> • Current Students • Faculty and Staff • Prospective Students • UEDP Council • Alumni and Friends • Employers • University Assessment Council 	<ul style="list-style-type: none"> • Web Site Posting • Fall Faculty/Staff Training • Fall UEDP Council Meeting • Annual Report (July 31)
2005 – 2006 Standardized Exit Exam - Total points on rubric; Data analysis Capstone Reports - Total points on rubric; Data analysis		
2006 – 2007 Alumni Survey: Data Analysis – Alumni Responses per Outcome Statistics		
2007 – 2008 Standardized Exit Exam - Total points on rubric; Data analysis Capstone Reports - Total points on rubric; Data analysis		
2008 – 2009 Alumni Survey: Data Analysis – Alumni Responses per Outcome Statistics		
2009 – 2010 Standardized Exit Exam - Total points on rubric; Data analysis Capstone Reports - Total points on rubric; Data analysis		

Date sent to the Assessment Council _____

Date reviewed by the Assessment Council _____

Approval Date _____

Assessment strategies to be used during 2004 -05 through 2009 – 10 include:

1. *Develop a follow-up instrument and letter of transmittal for gathering information from all graduates of the Vehicle Design program. Questions that need to be answered include:*
 - *What are the basic demographics (name, location, contact information, employer, position, title, etc)?*
 - *What did the graduates learn that was germane to their job performance?*
 - *What did the graduates not learn that is germane to their job performance?*
 - *Did the graduates receive an increase in job classification during their enrollment in the program or since graduation?*
 - *Did the graduates experience new/higher level assignments?*
 - *Is the graduate still employed in the Vehicle Design profession? If not – what area of employment?*
 - *What educational topics do the graduates still feel that they need additional preparation?*

The aforementioned points are considered secondary measures of learning, but the original assessment plan (1998) called for answers to most of these questions.

2. *Develop and administer a locally normed program standardized exit examination that students would take during their completion of the last 12 credits prior to graduation. This summative evaluation instrument would be developed by the faculty and with the support of the CEL/ProfEd staff/consultant. Utmost consideration will be given to content validity via faculty and advisory committees. Reliability will be established via statistical methods.*

Students can take the exam on a voluntary basis or it can be part of a senior level requirement. Individual scores will be provided only to the student; however, the faculty will receive a statistical report that includes high/low, mean score and score distribution. Reports should also include information regarding the distribution of scores within the major topic/courses areas as well.

A number of major proposed general concept areas include:

- *CAD/computer applications*
- *Design/graphics*
- *Materials*
- *Manufacturing processes*
- *Management/economics*
- *Tooling*
- *Mathematics*
- *GD & T*
- *Vehicle Design*
- *Quality*
- *All areas represented by individual course goals/objectives, etc.*

Each of these concept areas will have difficulty factors (coefficients) attached and each topic under the general concept will also have difficulty factors. Each topical area is represented by multiple test items, so the individual concept areas are represented by the total of all topical questions. It is intended that the examination will be a major part of summative evaluation/assessment process.

The aforementioned concept areas and learner performance are considered a primary measure.

3. *Capstone project reports/portfolios are used as a way to collect and evaluate student work. The theory behind such reports is that examining a student's work over a period of time provides a holistic assessment that demonstrates whether a student is progressing toward and truly achieving educational goals. While the primary goals of student reports/portfolios is assessment, portfolio formats can vary greatly, depending on who is assessing what.*

The length of time a capstone experience covers also varies. Faculty members/committees may institute capstones for assessment throughout a course. Or portfolios may be part of a larger assessment plan, led by the college or department, in which work is collected throughout the entire program or for a specific area of the curriculum, such as CAD, etc. While a portfolio that covers just one course may include a majority of the student's work for the course, longer-term portfolios tend to be more selective.

Both types of portfolios can be valuable. The class work samples (sometimes called artifacts) collected in a portfolio may include papers, projects, design work, CAD drawings, and videotapes or oral presentations. At some institutions this portfolio of work is used not only as an assessment tool but also as a marketing device for job searches and a reference aid for students to use in future courses or on the job.

This is intended that all capstone reports/portfolios be received and summarized by the consultant and faculty.