Program Assessment Plan Matrix

Program Unit or Department: Engineering

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<table>
<tr><th>Student Learning Outcomes</th><th>Assessment Methodology</th><th>Target</th><th>Summary of Major Findings</th><th>Actions Taken to Improve Student Learning</th><th>Timeframe</th></tr>
<tr><td rowspan="3">SO a:
Apply knowledge of math, science, & engineering</td><td>Method 1:
Course Level Assessment (CLA) EGR3099 Machine Component Design[1]</td><td>>80% will be ≥3 out of 4</td><td>Findings Method 1:
Target exceeded. 85.7% of students scored a 3 out of 4 in the CLA metric.
<table>
<tr><th>Year</th><th>Met Target</th><th>Exceeded Target</th></tr>
<tr><td>2017-18</td><td>85.7%</td><td></td></tr>
<tr><td>2018-19</td><td></td><td></td></tr>
<tr><td>2019-20</td><td></td><td></td></tr>
</table></td><td rowspan="3">Target met on CLA and RGS; continue to monitor

MFT results were lower than expected. It is possible that students were not motivated to perform well, since there were no consequences to doing poorly. The MFT will be embedded into EGR4022 Senior Design II course. Also, the importance of the test to the department will be emphasized; finally, a review of the major concepts will be held prior to the test.</td><td rowspan="3">Monitor CLA and RGS

Embed MFT into ENG4022 Senior Design Project II in spring 2019</td></tr>
<tr><td>Method 2:
Major Field Test (MFT)</td><td>80% of students receive ≥60% correct</td><td>Findings Method 2:
Target not met. In 2017-18 Overall average 45.7%; one student reached the target with 61.7% correct.
<table>
<tr><th>Year</th><th>Met Target</th><th>Exceeded Target</th></tr>
<tr><td>2017-18</td><td>17%</td><td>0%</td></tr>
<tr><td>2018-19</td><td></td><td></td></tr>
<tr><td>2019-20</td><td></td><td></td></tr>
</table></td></tr>
<tr><td>Method 3:
Recent Graduate Surveys (RGS)</td><td>Ave >80% (4 on a 5-point scale)</td><td>Findings Method 3:
Target exceeded. In 2017-18 the average ranking was 93.3%.
<table>
<tr><th>Year</th><th>Average</th></tr>
<tr><td>2017-18</td><td>93.3%</td></tr>
<tr><td>2018-19</td><td></td></tr>
<tr><td>2019-20</td><td></td></tr>
</table></td></tr>
</table>

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<tr><td rowspan="3">SO b:
Design and conduct experiments</td><td>Method 1:
Course Level Assessment (CLA)
EGR3044 Fluid Mechanics[2]</td><td>>80% will be ≥3 out of 4</td><td>Findings Method 1:

Target not met. In 2017-18 33% reached target

<table><tr><th>Year</th><th>Met Target</th><th>Exceeded Target</th></tr><tr><td>2017-18</td><td>33%</td><td></td></tr><tr><td>2018-19</td><td></td><td></td></tr><tr><td>2019-20</td><td></td><td></td></tr></table></td><td rowspan="3">CLAs did not reach target; additional equipment for these labs have been purchased; with more hands-on activities it is predicted that performance will improve.

May help to convert a regularly held lab into a class project

Graduates perceived that we obtained this objective.</td><td rowspan="3">Equipment has already been ordered for use in 2018/19

Labs will be converted into a project for use in both courses in 2018/19</td></tr>
<tr><td>Method 2:
Course Level Assessment (CLA)
EGR3014 Mechanics of Materials[3]</td><td>>80% will be ≥3 out of 4</td><td>Findings Method 2:

Target not met. In 2017-18 43% reached target

<table><tr><th>Year</th><th>Met Target</th><th>Exceeded Target</th></tr><tr><td>2017-18</td><td>43%</td><td></td></tr><tr><td>2018-19</td><td></td><td></td></tr><tr><td>2019-20</td><td></td><td></td></tr></table></td></tr>
<tr><td>Method 3:
Recent Graduate Surveys (RGS)</td><td>Ave ≥80% (4 on a 5-point scale)</td><td>Findings Method 3:

Target exceeded. In 2017-18 the average ranking was 90.0%.

<table><tr><th>Year</th><th>Average</th></tr><tr><td>2017-18</td><td>90%</td></tr><tr><td>2018-19</td><td></td></tr><tr><td>2019-20</td><td></td></tr></table></td></tr>
<tr><td>SO c:
Design a system to meet needs within realistic constraints</td><td>Method 1:
Course Level Assessment (CLA)
EGR3099 Machine Component Design[4]</td><td>>80% will be ≥3 out of 4</td><td>Findings Method 1:

Target exceeded. In 2017-18 85.7% scored 4 out of 4

<table><tr><th>Year</th><th>Met Target</th><th>Exceeded Target</th></tr><tr><td>2017-18</td><td>85.7%</td><td></td></tr><tr><td>2018-19</td><td></td><td></td></tr><tr><td>2019-20</td><td></td><td></td></tr></table></td><td>All targets were met; continue to monitor</td><td></td></tr>
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<tr><td rowspan="2"></td><td>Method 2:
Course Level Assessment (CLA)
EGR3053 Heat Transfer[5]</td><td>>80% will be ≥3 out of 4</td><td>Findings Method 2:
Target exceeded. In 2017-18 100% reached target
<table><tr><th>Year</th><th>Met Target</th><th>Exceeded Target</th></tr><tr><td>2017-18</td><td></td><td>100%</td></tr><tr><td>2018-19</td><td></td><td></td></tr><tr><td>2019-20</td><td></td><td></td></tr></table></td><td rowspan="2"></td><td rowspan="2"></td></tr>
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Recent Graduate Surveys (RGS)</td><td>Ave ≥80% (4 on a 5-point scale)</td><td>Findings Method 3:
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<table><tr><th>Year</th><th>Average</th></tr><tr><td>2017-18</td><td>80%</td></tr><tr><td>2018-19</td><td></td></tr><tr><td>2019-20</td><td></td></tr></table></td></tr>
<tr><td rowspan="2">SO d:
Function on multi-disciplinary teams</td><td>Method 1:
Course Level Assessment (CLA)
EGR4012 Senior Design I[6]</td><td>>80% will be ≥3 out of 4</td><td>Findings Method 1:
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<tr><td>Method 2:
Course Level Assessment (CLA)
EGR4022 Senior Design II[7]</td><td>>80% will be ≥3 out of 4</td><td>Findings Method 2:
Target exceeded. In 2017-18 100% reached target
<table><tr><th>Year</th><th>Met Target</th><th>Exceeded Target</th></tr><tr><td>2017-18</td><td>100%</td><td></td></tr><tr><td>2018-19</td><td></td><td></td></tr><tr><td>2019-20</td><td></td><td></td></tr></table></td></tr>
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Recent Graduate Surveys (RGS)</td><td>Ave ≥80% (4 on a 5-point scale)</td><td>Findings Method 3:
Target exceeded. In 2017-18 the average ranking was 83.3%.<table><tr><th>Year</th><th>Average</th></tr><tr><td>2017-18</td><td>83.3%</td></tr><tr><td>2018-19</td><td></td></tr><tr><td>2019-20</td><td></td></tr></table></td><td></td><td></td></tr>
<tr><td rowspan="3">SO e:
Identify, formulate, and solve engineering problems</td><td>Method 1: Course Level Assessment (CLA) EGR3014 Mechanics of Materials[8]</td><td>>80% will be ≥3 out of 4</td><td>Findings Method 1:
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<tr><td>Method 2: Course Level Assessment (CLA) EGR3033 System Dynamics[9]</td><td>>80% will be ≥3 out of 4</td><td>Findings Method 2:
Target exceeded. In 2017-18 100% reached target<table><tr><th>Year</th><th>Met Target</th><th>Exceeded Target</th></tr><tr><td>2017-18</td><td>100%</td><td></td></tr><tr><td>2018-19</td><td></td><td></td></tr><tr><td>2019-20</td><td></td><td></td></tr></table></td></tr>
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<tr><td rowspan="3">SO f:
Understand professional and ethical responsibility</td><td>Method 1: Course Level Assessment (CLA) EGR4012 Senior Design Projects I[10]</td><td>>80% will be ≥3 out of 4</td><td>Findings Method 1:
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<tr><td>Method 2: Course Level Assessment (CLA) EGR4022 Senior Design Project II[11]</td><td>>80% will be ≥3 out of 4</td><td>Findings Method 2:
Target exceeded. In 2017-18 100% reached target
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<tr><td>SO g:
Communicate effectively</td><td>Method 1: Course Level Assessment (CLA) EGR3099 Machine Component Design[12]</td><td>>80% will be ≥3 out of 4</td><td>Findings Method 1:
Target exceeded. In 2017-18 100% reached target
<table><tr><th>Year</th><th>Met Target</th><th>Exceeded Target</th></tr><tr><td>2017-18</td><td>100%</td><td></td></tr><tr><td>2018-19</td><td></td><td></td></tr><tr><td>2019-20</td><td></td><td></td></tr></table></td><td>All targets were met; continue to monitor</td><td></td></tr>
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<tr><td rowspan="2"></td><td>Method 2: Course Level Assessment (CLA) EGR4022 Senior Design Projects II[13]</td><td>>80% will be ≥3 out of 4</td><td>Findings Method 2:
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<tr><td rowspan="2">SO h:
Understand the impact of engineering solutions</td><td>Method 1: Course Level Assessment (CLA) EGR3099 Machine Component Design[14]</td><td>>80% will be ≥3 out of 4</td><td>Findings Method 1:
Target exceeded. In 2017-18 85.7% at 3 or 4
<table><tr><th>Year</th><th>Met Target</th><th>Exceeded Target</th></tr><tr><td>2017-18</td><td>85.7%</td><td></td></tr><tr><td>2018-19</td><td></td><td></td></tr><tr><td>2019-20</td><td></td><td></td></tr></table></td><td rowspan="2">Need to incorporate more assessment methods for this SO. The curriculum map for assessment of this outcome has been updated.</td><td rowspan="2">The curriculum map for assessment of this outcome has been updated.</td></tr>
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<tr><td rowspan="3">SO i:
Life-long learning</td><td>Method 1: Course Level Assessment (CLA) EGR3099 Machine Component Design[15]</td><td>>80% will be ≥3 out of 4</td><td>Findings Method 1:
Target not met. In 2017-18 71.4% at 3 or 4
<table><tr><th>Year</th><th>Met Target</th><th>Exceeded Target</th></tr><tr><td>2017-18</td><td>71.4%</td><td></td></tr><tr><td>2018-19</td><td></td><td></td></tr><tr><td>2019-20</td><td></td><td></td></tr></table></td><td rowspan="3">Target not reached in one CLA. There is a need to have a greater emphasis on life-learning throughout our program.

We need to incorporate more assessment methods for this SO in upper-level courses. This should encourage more of emphasis on the outcome.</td><td rowspan="3">The curriculum map for assessment of this outcome has been updated.</td></tr>
<tr><td>Method 2: Course Level Assessment (CLA) EGR1014 Intro to Engineering[16]</td><td>>80% will be ≥3 out of 4</td><td>Findings Method 2:
Target exceeded. In 2017-18 89% reached target
<table><tr><th>Year</th><th>Met Target</th><th>Exceeded Target</th></tr><tr><td>2017-18</td><td>89%</td><td></td></tr><tr><td>2018-19</td><td></td><td></td></tr><tr><td>2019-20</td><td></td><td></td></tr></table></td></tr>
<tr><td>Method 3: Recent Graduate Surveys (RGS)</td><td>Ave ≥80% (4 on a 5-point scale)</td><td>Findings Method 3:
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<tr><td rowspan="3">SO j:
Knowledge of contemporary issues</td><td>Method 1: Course Level Assessment (CLA) EGR3099 Machine Component Design[17]</td><td>>80% will be ≥3 out of 4</td><td>Findings Method 1:
Target exceeded. In 2017-18 85.7% reached target
<table><tr><th>Year</th><th>Met Target</th><th>Exceeded Target</th></tr><tr><td>2017-18</td><td>85.7%</td><td></td></tr><tr><td>2018-19</td><td></td><td></td></tr><tr><td>2019-20</td><td></td><td></td></tr></table></td><td rowspan="3">Targets were reached with all methods; continue to monitor</td><td rowspan="3"></td></tr>
<tr><td>Method 2: Course Level Assessment (CLA) EGR2073 Thermodynamics[18]</td><td>>80% will be ≥3 out of 4</td><td>Findings Method 2:
Target exceeded. In 2017-18 95% reached target
<table><tr><th>Year</th><th>Met Target</th><th>Exceeded Target</th></tr><tr><td>2017-18</td><td>95%</td><td></td></tr><tr><td>2018-19</td><td></td><td></td></tr><tr><td>2019-20</td><td></td><td></td></tr></table></td></tr>
<tr><td>Method 3: Recent Graduate Surveys (RGS)</td><td>Ave ≥80% (4 on a 5-point scale)</td><td>Findings Method 3:
Target met. In 2017-18 the average ranking was 80.0%.
<table><tr><th>Year</th><th>Average</th></tr><tr><td>2017-18</td><td>80%</td></tr><tr><td>2018-19</td><td></td></tr><tr><td>2019-20</td><td></td></tr></table></td></tr>
<tr><td>SO k:
Skills necessary for engineering practice</td><td>Method 1: Course Level Assessment (CLA) EGR3033 System Dynamics[19]</td><td>>80% will be ≥3 out of 4</td><td>Findings Method 1:
Target not met. In 2017-18 46% reached target
<table><tr><th>Year</th><th>Met Target</th><th>Exceeded Target</th></tr><tr><td>2017-18</td><td>46%</td><td></td></tr><tr><td>2018-19</td><td></td><td></td></tr><tr><td>2019-20</td><td></td><td></td></tr></table></td><td>Target was not reached in CLAs; however, MATLAB will be incorporated into more courses across the curriculum; therefore, it is anticipated that performance in this area will be increased.</td><td>MATLAB is now part of Machine Synthesis, Machine Component Design, Automatic Control Systems, and Digital Signal Processing</td></tr>
</table>

<table>
<tr>
<td rowspan="2"></td>
<td>Method 2: Course Level Assessment (CLA) EGR3014 Mechanics of Materials [20]</td>
<td>>80% will be ≥3 out of 4</td>
<td>Findings Method 2:
Target not met. In 2017-18 71.4% reached target
<table>
<tr><th>Year</th><th>Met Target</th><th>Exceeded Target</th></tr>
<tr><td>2017-18</td><td>71.4%</td><td></td></tr>
<tr><td>2018-19</td><td></td><td></td></tr>
<tr><td>2019-20</td><td></td><td></td></tr>
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Target met. In 2017-18 the average ranking was 80.0%.
<table>
<tr><th>Year</th><th>Average</th></tr>
<tr><td>2017-18</td><td>80%</td></tr>
<tr><td>2018-19</td><td></td></tr>
<tr><td>2019-20</td><td></td></tr>
</table></td>
</tr>
<tr>
<td rowspan="2">SO I:
Christian worldview and character</td>
<td>Method 1: Course Level Assessment (CLA) EGR3099 Machine Component Design[21]</td>
<td>>80% will be at 3 out of4</td>
<td>Findings Method 1:
Target exceeded. In 2017-18 100% reached target goal
<table>
<tr><th>Year</th><th>Met Target</th><th>Exceeded Target</th></tr>
<tr><td>2017-18</td><td></td><td></td></tr>
<tr><td>2018-19</td><td></td><td></td></tr>
<tr><td>2019-20</td><td></td><td></td></tr>
</table></td>
<td rowspan="2">Targets met using two out of 3 methods

CLA in which target was not met was a homework assignment without significant bearing on the final grade; the assignment will be weighted more heavily in the future

In order to cover this outcome more thoroughly, a classroom lecture will be devoted to it</td>
<td rowspan="2">Assignment in EGR2073 will be weighted more heavily in the future

Classroom lecture will be incorporated from now on</td>
</tr>
<tr>
<td>Method 2: Course Level Assessment (CLA) EGR2073 Thermodynamics [22]</td>
<td>>80% will be ≥3 out of 4</td>
<td>Findings Method 2:
Target not met. In 2017-18 76% reached target
<table>
<tr><th>Year</th><th>Met Target</th><th>Exceeded Target</th></tr>
<tr><td>2017-18</td><td>76%</td><td></td></tr>
<tr><td>2018-19</td><td></td><td></td></tr>
<tr><td>2019-20</td><td></td><td></td></tr>
</table></td>
</tr>
</table>

	Method 3: Recent Graduate Surveys (RGS)	Ave >80% (4 on a 5-point scale)	Findings Method 3: Target **exceeded**. In 2017-18 the average ranking was 100%. Year / Average 2017-18: 100% 2018-19: 2019-20:		

Specific Assignments for Each Method

Student Outcomes	Method	Key Assignments
SO a: *Apply knowledge of math, science, & engineering*	[1]**SOa** – CLA EGR3099 Machine Component Design	Tests 1, 2 and Final Exam
SO b: *Design and conduct experiments*	[2]**SOb** – CLA EGR3044 Fluid Mechanics	Six lab reports
	[3]**SOb** – CLA EGR3014 Mechanics of Materials	Torsion strength of materials lab
SO c: *Design a system to meet needs within realistic constraints*	[4]**SOc** – CLA EGR3099 Machine Component Design	Test 2 problem #5
	[5]**SOc** – CLA EGR3053 Heat Transfer	Heat transfer project
SO d: *Function on multi-disciplinary teams*	[6]**SOd** – CLA EGR4012 Senior Design Project I	Peer review and faculty assessment
	[7]**SOd** – CLA EGR4022 Senior Design Project II	Peer review and faculty assessment
SO e: *Identify, formulate, and solve engineering problems*	[8]**SOe** – CLA EGR3014 Mechanics of Materials	Tests 1 and 2
	[9]**SOe** – CLA EGR3033 Systems Dynamics	Quiz 2, Quiz 4, & Quiz 5
SO f: *Understand professional and ethical responsibility*	[10]**SOf** – CLA EGR4012 Senior Design Projects I	Develop reports, briefings, and other products suited to each phase of the project (observations and reports/presentations)
	[11]**SOf** – CLA EGR4012 Senior Design Projects I	Develop reports, briefings, and other products suited to each phase of the project (observations and reports/presentations)
SO g: *Communicate effectively*	[12]**SOg** – CLA EGR3099 Machine Component Design	Ariel Foundation Park Learning Station Project Presentation
	[13]**SOg** – CLA EGR4022 Senior Design Projects II	Final Presentations
SO h: *Understand the impact of engineering solutions*	[14]**SOh** – CLA EGR3099 Machine Component Design	1) Commentary on engine blade failure of Southwest Airline 2) Ariel Foundation Park Learning Station Project Presentation
SO i: *Life-long learning*	[15]**SOi** – CLA EGR3099 Machine Component Design	Test 2 problem #2 & Homework #5 & #13
	[16]**SOi** – CLA EGR1014 Introduction to Engineering	Technical report
SO j: *Knowledge of contemporary issues*	[17]**SOj** – CLA EGR3099 Machine Component Design	Commentary on engine blade failure of Southwest Airline
	[18]**SOj** – CLA EGR2073 Thermodynamics	Report for mini design and essay problem from chapter 3
SO k: *Skills necessary for engineering practice*	[19]**SOk** – CLA EGR3033 System Dynamics	Final Exam Question 7, Assignment 5
	[20]**SOk** – CLA EGR3099 Mechanics of Materials	Excel lab on generating shear and bending moment diagrams

Student Outcomes	Method	Key Assignments
SO I: *Christian worldview and character*	[21]**SOI** – CLA EGR3099 Machine Component Design	Homework #10
	[23]**SOI** – CLA EGR2073 Thermodynamics	Read the paper "Engineering Through Eyes of Faith" and answer a series of questions