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| **PROGRAM NAME:** Engineering Field of Study | **AUTHORING TEAM CONTACT:** Katherine Hedberg |
| **PHONE:** 9725531182 | **EMAIL:** katherinehedberg@colln.edu |

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| GUIDELINESTime Frames1. Scope:

The time frame of program review is five years, including the year of the review. Data being reviewed for any item should go back the previous four years, unless not available. 1. Deadline Dates:

January 15th – Program Review Document due to Department Dean for review (Deans may require submissions at their own, earlier due date)February 1st – Program Review Document due to Program Review Steering Committee1. Years:

Years 1 & 3 – Implement Action Plan of (CIP) and collect dataYears 2 & 4 – Analyze data and findings, Update Action PlanYear 5 – Write Program Review of past 5 years; Write Continuous Improvement Plan (CIP) and create new Action PlanLENGTH OF RESPONSES: Information provided to each question may vary but should be generally kept in the range of 1-2 pages or 500-1,000 words.**EVIDENCE GUIDELINES**: In the following sections, you will be asked to provide evidence for assertions made. 1. Sources: This evidence may come from various sources including professional accreditation reviews, THECB, Texas Workforce Commission’s CREWS, Institutional Research Office (IRO), National Student Clearinghouse, IPEDS, JobsEQ, EMSI Career Coach, and may be quantitative and/or qualitative. If you are unfamiliar with any of these information sources, contact the Institutional Research Office at: effectiveness@collin.edu. Use of additional reliable and valid data sources of which you are aware is encouraged.
2. Examples of Evidence Statements:
3. Poor example: Core values are integrated into coursework. (Not verifiable)
4. Good example: Core values are integrated into coursework through written reflections. (Verifiable, but general)
5. Better example: Core values are integrating into coursework through written reflections asking the student to describe how s/he will demonstrate each of the core values in his or her professional life and demonstrated through service learning opportunities. (Replicable, Verifiable)

**FOR MORE INFORMATION:**The Program Review Portal can be found at<http://inside.collin.edu/institutionaleffect/Program_Review_Process.html>*.* Any further questions regarding Program Review should be addressed to the Institutional Research Office (effectiveness@collin.edu, 972.599.3102). |

**Introduction/Preface**

[x] **EXECUTIVE SUMMARY**

**Briefly summarize the topics that are addressed in this self-study, including areas of strengths and areas of concern. (Information to address this Executive Summary may come from later sections of this document; therefore, this summary may be written after these sections have been completed.)** Please do not include information in this section that is not already provided elsewhere in this submission. Using the questions in the template as headings in the Executive Summary can provide structure to the overview document (see below for suggested format).

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| **Executive Summary (suggested sections/format-not required format)**What does our program do?Why do we do the things we do: Program relationship to the College Mission & Strategic Plan. Why we do the things we do? Program relationship to student demand.Why we do the things we do? Program relationship to market demand.How effective is our curriculum and how do we know?How effectively do we communicate, and how do we know? How well are we leveraging partnership resources and building relationships, and how do we know?How have past Continuous Improvement Plans contributed to success?How will we evaluate our success? |

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| **Complete the Executive Summary below after you have completed your review.****1. What does our academic program do?**The Mechanical Engineering Field of Study (FOS), Civil Engineering FOS and Electrical Engineering FOS programs offer the courses needed to complete the first two years of an baccalaureate engineering degree. Students who complete one of the engineering FOS programs are ready to succeed in advanced engineering design courses.**2. Why do we do the things we do: Program relationship to the College Mission & Strategic Plan.**The engineering programs relate to the Collin Mission in several ways. They develop skills ranging from critical analysis of data to communication, they strengthen character through introduction of professional ethics, and they challenge the intellect through rigorous, technical coursework.The programs also support the Strategic Plan. They support Strategic Goal 3 with six well established pathways for transfer in mechanical engineering, civil engineering, and electrical engineering. The programs also support Strategic Goal 4 with two new partnerships linking Collin College to Texas A&M University’s Engineering Academy and to Texas State University’s engineering program.**3. Why we do the things we do: Program relationship to student demand.**The engineering programs are meeting student demand. Enrollment in every FOS program has increased by an order of magnitude over the past four years.**4. Why we do the things we do: What marketable skills should students have after completing our program?**The Mechanical Engineering FOS, Civil Engineering FOS, and Electrical Engineering FOS programs all develop a collection of marketable skills. These skills include (a)communicating effectively and professionally and (b) analyzing data critically to reach sounds conclusions. Both of these skills are in demand by current engineering employers, per the literature. **5. How effective is our curriculum, and how do we know?**The Engineering Department averages 19 FOS completers and 13 AS completers annually over the last five years. Metrics of grade distribution, success rates, and class size all indicate that the program is thriving. **6. How effectively do we communicate, and how do we know?**The Engineering Department has a comprehensive website detailing courses, four-year pathways, department specific clubs and professional organizations. Faculty, staff, and administration are clearly listed in multiple locations. The department has a dedicated recruiter and academic advisor. **7. How well are we leveraging partnership resources and building relationships, and how do we know?**The Engineering Department has developed and currently maintains strong relationships with multiple Universities in the state of Texas. It also has connections with local industry partners through a student chapter of the professional society, Society of Women Engineers, as well as annual career events that bring in local industry representatives.**8. What professional developmental opportunities add value to your program?**Both full-time and part-time faculty members prioritize professional development. This development centers around the engineering field and higher education. **9. Are facilities, equipment, and funding sufficient to support the program?** No additional funds, equipment, or facilities are requested.**10. How have past Continuous Improvement Plans contributed to success?**Past Continuous Improvement Plans (CIP) have identified areas of growth in communication between adjunct and full-time faculty members. The metrics associated with academic performance were all met or exceeded.**11. How will we evaluate our success?**In light of the achieved or exceeded performance from past CIP metrics, new targeted metrics have been developed. These will help the department hone professional communication and targeted learning outcomes. |

Section I. *Are We Doing the Right Things?*

[x] **1. WHAT DOES OUR ACADEMIC PROGRAM DO?**
 **What is the program and its context?**This section is used to provide an overview description of the program, its relationship to the college and the community it serves. **Keep in mind the reviewer may not be familiar with your area**. Therefore, provide adequate explanation as needed to ensure understanding.

*Suggested points to consider:*

* *Program’s purpose (Include the program’s mission statement if one exists.)*
* *Program learning outcomes or marketable skills*
* *Brief explanation of who the program serves*
* *Degree paths it prepares graduates to enter*
* *What regulatory standards must the program meet (THECB, Workforce, external accreditation)*

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| ***Program’s purpose:*** The Engineering Field-of-Study (FOS) program teaches the foundational engineering concepts needed to transfer to a four-year institution where students can complete their engineering degree. There are three focus areas within the program: Mechanical Engineering (ME), Civil Engineering (CE) and Electrical Engineering (EE). The foundational concepts within each specialty include basic analysis of structures, systems in motion and in equilibrium, basic material behavior, electrical circuit analysis, and computer drafting. Students develop these skills in the program through practice problems, assignments, and in-class exercises with peers and their instructors. Upon completing the program, students are ready to succeed in advanced engineering design courses.  ***Program learning outcome or marketable skills:*** During completion of the Civil Engineering FOS program, students will develop the following marketable skills: * Perform calculations in the areas of Statics and Dynamics.
* Apply principles of physics to analyze various civil engineering designs.
* Analyze various design solutions.
* Analyze structural forces.
* Communicate effectively and professionally.
* Work collaboratively with others to achieve goals.
* Analyze data critically to reach sound conclusions.

During completion of the Mechanical Engineering FOS program, students will have developed the following marketable skills: * Perform calculations in the areas of Statics and Dynamics.
* Analyze electric circuits
* Analyze various design solutions.
* Analyze structural forces.
* Communicate effectively and professionally.
* Work collaboratively with others to achieve goals.
* Analyze data critically to reach sound conclusions.

During completion of the Electrical Engineering FOS program, students will have developed the following marketable skills: * Perform calculations in the areas of circuit analysis.
* Apply principles of physics to analyze various electrical engineering designs.
* Analyze various design solutions.
* Communicate effectively and professionally.
* Write computer programs related to the electrical engineering field.
* Work collaboratively with others to achieve goals.
* Analyze data critically to reach sound conclusions.

Source: Collin College Programs and Courses https://www.collin.edu/academics/programs/MrktSkills\_CivilEng.html ***Brief explanation of who the program serves:*** The Civil Engineering FOS program serves students planning to earn a bachelor’s degree in civil engineering. The Mechanical Engineering FOS serves students planning to earn a bachelor’s degree in mechanical engineering. The Electrical Engineering FOS serves students planning to earn a bachelor’s degree in electrical engineering. ***Degree paths it prepares graduates to enter:*** Students who have completed a Civil Engineering, Mechanical Engineering, or Electrical Engineering FOS program are ready to smoothly transition into a baccalaureate degree program for that engineering specialty.  Source: Collin College Transfer Programs https://www.collin.edu/transferu/ ***What regulatory standards must the program meet (THECB, Workforce, external accreditation)?*** All three engineering field-of-study programs fall under the regulation of the Texas Higher Education Coordinating Board (THECB).  |

[x] **2. WHY DO WE DO THE THINGS WE DO: PROGRAM RELATIONSHIP TO THE COLLEGE MISSION & STRATEGIC PLAN.**

* **Provide program-specific evidence of actions that document how the program supports the College’s** [**mission statement**](https://www.collin.edu/aboutus/)**:** “*Collin County Community College District is a student and community-centered institution committed to developing skills, strengthening character, and challenging the intellect.”*
* **Provide program-specific evidence that documents how the program supports the College’s strategic plan (2020-2025 Strategic Plan)**: <https://www.collin.edu/aboutus/strategic_goals.html>.

*Suggested/possible points to consider:*

* *What evidence is there to support assertions made regarding how the program relates to the mission and strategic plan?*
* *Think broadly-increasing completion, pathways to 4-yr and from high schools, etc.*
* *Analyze the evidence you provide. What does it show about the program?*

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| ***Provide program-specific evidence of actions that document how the program supports the College’s mission statement: “Collin County Community College District is a student and community-centered institution committed to developing skills, strengthening character, and challenging the intellect.”*** *Mission statement: “Collin County Community College District is a student and community-centered institution committed to* ***developing skills****, strengthening character, and challenging the intellect.”* Every field of engineering is, fundamentally, about problem solving. To solve a problem, engineers apply creative solutions to everyday challenges within a highly technical framework. Training future engineers to problem solve requires development of a wide array of skills, both technical and non-technical.  Our students have these skills developed in all the engineering courses offered in our program. From the most basic ENGR1201: Introduction to Engineering course to one of the program's most advanced, ENGR2332: Mechanics of Materials, students are developing these skills. Throughout the program, their math and science skills are sharpened, their ability to think critically and communicate is honed, and their professional ethics are developed. A selection of specific examples of marketable skills developed in this program are provided below: * Apply principles of physics to analyze various engineering designs
* Communicate effectively and professionally.
* Work collaboratively with others to achieve goals.
* Analyze data critically to reach sound conclusions.

All of these are pivotal to successful performance as an engineering student, a practicing engineer, and, arguably, any other professional field. *Mission statement: “Collin County Community College District is a student and community-centered institution committed to developing skills****, strengthening character****, and challenging the intellect.”* All fields of engineering are about serving and improving the way that society functions. Within civil, mechanical, and electrical engineering, professionals design, build, retrofit, and maintain the infrastructure, machinery, and technology that, together, allow society to function. Students who choose study engineering can expect to make a real, practical difference in the lives of their fellow citizens upon graduation.  Our students are encouraged in these endeavors in our ENGR2301: Statics, ENGR2302: Dynamics, and ENGR2332: Mechanics of Materials courses. All three have classroom examples specifically selected from the text, literature, and faculty experience in industry to show students the way that their calculations, in concert with their professional ethics, will matter in practice. This practical map between in-class performance and future professional outcomes helps to strengthen their character and develop care for their projects, contractors, and the project’s end users. *Mission statement: “Collin County Community College District is a student and community-centered institution committed to developing skills, strengthening character, and* ***challenging the intellect.”*** All engineering courses challenge the intellect. Engineering courses include both theory and practical application of theory, with a rigorous technical component. Selected learning outcomes that support this statement are listed below: * ENGR2301: Mechanics 1 (Statics)
* State the fundamental principles used in the study of mechanics.
* Determine unknown forces and couples acting on objects in equilibrium.
* ENGR2332: Mechanics of Materials
* Calculate stress, strain and deflection in statically determinate and indeterminate members subject to axial, bending, torsional, thermal, and pressure loads, both individually and in combination.
* Transform stresses and strains from one coordinate system to another.
* ENGR2305: Electrical Circuits I
* Explain basic electrical concepts, including electric charge, current, electrical potential, electrical power, and energy.
* Analyze first and second order AC and DC circuits for steady-state and transient response in the time domain and frequency domain.

The Engineering FOS faculty also serve on a range of campus- and district-wide committees that support Collin College’s mission that include, but are not limited to: * Society of Women Engineers (Professor Susan Stancy Abraham)
* Collin Organization for Artificial Intelligence Development (CO-AID) committee (Dr. Katherine Hedberg)
* Collin Foundation Scholarship Committee (Dr. Katherine Hedberg)
* Robotics Club (Dr. Yiping Wang)

***Provide program-specific evidence that documents how the program supports the College’s strategic plan (2020-2025 Strategic Plan): https://www.collin.edu/aboutus/pdfs/202020205Master-StrategicPlan.pdf*** The Engineering Department supports Collin College’s Strategic Goals in the following ways: *Strategic Goal 3: Create and implement comprehensive integrated pathways to support student transitions.* The Engineering Department has multiple well-established pathways for transfer. Existing pathways include: * [University of Texas at Arlington – Civil Engineering](https://www.collin.edu/transferu/2021pathways/CC_UTA%20Civil%20Engineering.pdf)
* [University of Texas at Tyler – Civil Engineering](https://www.collin.edu/transferu/2021pathways/CC_UTT%2021-22%20Civil%20Engineering%20AS%20to%20BS%20edit.pdf)
* [University of Texas at Dallas – Mechanical Engineering](https://utdallas.app.box.com/s/cabou1mgw9lp8qlv1fes9enbkf9dtx15)
* [University of Texas at Dallas – Electrical Engineering](https://utdallas.app.box.com/s/ghh5l4icdro5xc4d3rp4vblw9lle2tg0)
* [University of Texas at Tyler – Mechanical Engineering](https://www.collin.edu/transferu/2021pathways/CC_UTT%2021-22%20mechanical%20Engineering%20AS%20to%20BS%20edit.docx.pdf)
* [University of Texas at Tyler – Electrical Engineering](https://www.collin.edu/transferu/2021pathways/CC_UTT%2021-22%20Electrical%20Engineering%20AS%20to%20BS%20edit.pdf)

 There are also established pathways for biomedical, computer, and chemical engineering.  Source: Engineering Department Transfer Pathways, Collin College, https://www.collin.edu/department/engineering/engineeringtransfer.html *Strategic Goal 4: Implement the third Baccalaureate degree by Fall 2022 and continue adding 2+2 programs with university partners.* As noted above, there are currently six transfer pathways in place for civil, mechanical, and electrical engineering (replicated below). The department is also developing a new partnership with Texas State University. Additionally, the Engineering Department will be providing support and facilities for the newly established branch of Texas A&M University’s Engineering Academy. * [University of Texas at Arlington – Civil Engineering](https://www.collin.edu/transferu/2021pathways/CC_UTA%20Civil%20Engineering.pdf)
* [University of Texas at Tyler – Civil Engineering](https://www.collin.edu/transferu/2021pathways/CC_UTT%2021-22%20Civil%20Engineering%20AS%20to%20BS%20edit.pdf)
* [University of Texas at Dallas – Mechanical Engineering](https://utdallas.app.box.com/s/cabou1mgw9lp8qlv1fes9enbkf9dtx15)
* [University of Texas at Dallas – Electrical Engineering](https://utdallas.app.box.com/s/ghh5l4icdro5xc4d3rp4vblw9lle2tg0)
* [University of Texas at Tyler – Mechanical Engineering](https://www.collin.edu/transferu/2021pathways/CC_UTT%2021-22%20mechanical%20Engineering%20AS%20to%20BS%20edit.docx.pdf)
* [University of Texas at Tyler – Electrical Engineering](https://www.collin.edu/transferu/2021pathways/CC_UTT%2021-22%20Electrical%20Engineering%20AS%20to%20BS%20edit.pdf)

Source: *Engineering Department Transfer Pathways,* <https://www.collin.edu/academics/programs/FOS_Eng_1Overview.html>  |

[x] **3. Why we do the things we do: Program relationship to student demand**

Make a case with evidence to show that students want to enroll in the program. Discuss whether or not there appears to be any disproportionate enrollment by gender, race, or ethnicity (compared to Collin College’s overall student demographic distribution <http://inside.collin.edu/iro/programreview/prfilehostpage.html>). If any differences exist discuss possible reasons why the gap exists, and plans to address these issues to close gaps in enrollment rates between groups of students (refer to the Program Review portal for Enrollment Reports and Average Section Size data file <http://inside.collin.edu/institutionaleffect/Program_Review_Process.html>).

*Suggested/possible points to consider:*

* *The number of students who completed the award in each of the last 5 years.*
* *What is the enrollment pattern? Declining, flat, growing, or not exhibiting a stable pattern; please explain.*
* *What are the implications for the next 5 years if the enrollment pattern for the past 5 years continues?*
* *Describe any actions taken to identify and support students enrolled in program-required courses early in the degree plan. Are there any specific supports for a diverse student population? If no actions are taken at the present, please develop and describe a plan to do so.*
* *Analyze the evidence you provide. What does it show about the program?*

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| ***Program’s Relationship to Student Demand:*** First, the statement, “make a case with evidence that students want to enroll in the program” should be addressed. Before consideration of demographics, success, and other metrics, it must be established that the program under consideration is serving the needs of, and delivering a quality education to, our community, per Collin College’s mission statement. The Engineering Department is clearly meeting both those criteria, as illustrated by the enrollment data alone. Consider the overall enrollment in all three engineering specialties. The enrollment has increased dramatically over the past five years. The civil engineering program has seen continued, tremendous growth from 16 enrolled students in Fall 2018 to 164 enrolled students in Fall 2021. There was a drop in student enrollment in Fall 2022 to 112 enrolled students. This may be attributed to a shifted focus from civil engineering to the mechanical engineering program, which competes for the same student cohort. The mechanical engineering program saw even more explosive growth, from 42 students enrolled in the Fall 2018 semester to 417 in the Fall 2022 semester. The electrical engineering program showed the same pattern, with a starting enrollment of 21 students in the Fall 2018 semester growing to 209 students in the Fall 2022 semester. Overall enrollment in every engineering specialty used for this report has trended up by an order of magnitude over the course of the review period (2018 – 2022). *C:\Users\katherinehedberg\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\E498F97D.tmp* Figure 1: Civil Engineering FOS – Enrollment *C:\Users\katherinehedberg\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\B1170593.tmp* Figure 2: Mechanical Engineering FOS – Enrollment *C:\Users\katherinehedberg\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\9B74E819.tmp* Figure 3: Electrical Engineering FOS – Enrollment  With the value of the engineering program clearly established, additional analysis of demographic distribution is presented below. *Considering gender:* All three engineering specialties program follow the general trends in undergraduate engineering. Nationally, approximately 27% of civil engineering degrees were earned by females. This matches Collin College’s enrollment data, as shown below in Figure 4: Gender by Year. The Civil Engineering FOS program has approximately 25% female student population. The program dipped briefly in 2020, but has returned to the mid-to-high twenties in years 2021, 2022, and 2023. See Appendix E for graphs.Similarly, about 17% of mechanical engineering degrees in the United States are earned by women. At Collin College, the percent of females enrolled in the mechanical engineering specialty is slightly below that, hovering between 11% and 13% of the student cohort. See Appendix A for graphs.Lastly, women account for approximately 20% of the electrical engineering degrees earned. The student enrollment at Collin College has been more volatile than the other disciplines, moving between 13% and 20% over the five years examined. The enrollment was within 4% of the national average for three of the five years. See Appendix I for graphs.In conclusion, every engineering specialty either corresponds to the national average or is within 6% of that target. The department has a well-established and active chapter of the Society of Women Engineers (SWE) which provides support for all students, male and female. Overall, the male/female demographics meet national averages, and the department actively supports all students.Source: American Society of Civil Engineers (ASCE) Demographic Report, <https://www.asce.org/-/media/asce-images-and-files/diversity-equity-and-inclusion/documents/asce-demographic-profile-report.pdf> Source: Society of Women Engineers, Women in Engineering: Analyzing 20 Years of Social Science Literature. <https://magazine.swe.org/lit-review-22/> Source: American Society for Engineering Education. (2023). Engineering and Engineering Technology By the Numbers 2022. Tables 1.1.1, 1.1.4. Source: Institutional Records Office, j:\\IRO\Robinson\Data\2023-24\Engineering FOS – Civil\Civil Engineering – Unduplicated Enrollment.  Source: Institutional Records Office, j:\\IRO\Robinson\Data\2023-24\Engineering FOS – Mechanical\Mechanical Engineering FOS – Unduplicated Enrollment Source: Institutional Records Office, j:\\IRO\Robinson\Data\2023-24\Engineering FOS – Electrical\Electrical Engineering FOS – Unduplicated Enrollment *Considering demographic information:* As for demographic information, the engineering programs align with the general enrollment data for the College as a whole with no group varying by more than 7% percent, with one exception. For the Electrical Engineering FOS program, the number of Asian students enrolled in the program was higher than the college as a whole.  See Appendices A, E, and I for graphs of distribution. |

### [x] **4. WHY WE DO THE THING WE DO: WHAT MARKETABLE SKILLS SHOULD STUDENTS HAVE AFTER COMPLETING OUR PROGRAM?**

**Make a case with evidence to show that the program teaches skills that are useful in the workplace.**

*Suggested/possible points to consider:*

* *What foundational skills and knowledge do employers say they want?*
* *Provide evidence from national, state, and/or local employer surveys, studies, editorials and other sources that identify current employer expectations for baccalaureate graduates in program-related fields.*

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| A brief survey of the needs of the engineering profession yields several common, key skills that employers are looking for in entry-level engineers. Collin College’s engineering department works to develop those skills in all students. The marketable skills and learning outcomes from each engineering specialty speak to these needs, as illustrated below.First, students must have a solid technical foundation. Entry-level engineers are expected to have a strong working knowledge of basic engineering theories and practices. The engineering department offers the foundational coursework for mechanical, civil, and electrical engineering baccalaureate degrees. In the College’s defined marketable skills, civil and mechanical engineers will be able to “perform calculations in the areas of Statics and Dynamics”, mechanical and electrical engineering students will be able to “analyze electrical circuits” and “perform calculations in the areas of circuit analysis”. These skills ensure the solid technical foundation expected and required by engineering employers.*Source:* [*Civil Engineering Body of Knowledge: Preparing the Future Civil Engineer*](https://ascelibrary.org/doi/book/10.1061/9780784415221)*, Civil Engineering Body of Knowledge 3 Task Committee, Third Edition****.*** *2019**Source: National Engineering Service Corporation (NESC), A Guide to Entry-Level Mechanical Engineering Jobs.* [*https://www.nesc.com/mechanical-engineering/*](https://www.nesc.com/mechanical-engineering/)Second, students must be able to communicate. Whether they are submitting calculations to a supervisor, explaining project goals to a colleague, or presenting an engineering solution to a client or the public, the quality of their communication can determine the success or failure of a project. The engineering department ensures that students are able to “communicate effectively and professionally” upon graduation from all three engineering specialties. This marketable skill is present in all three engineering FOS programs.*Source: Institute of Electrical and Electronics Engineers (IEEE), Professional Communication Society* [*https://procomm.ieee.org/effective-communication-for-engineers/*](https://procomm.ieee.org/effective-communication-for-engineers/) |

Section II. *Are We Doing Things Right?*

### [x] **5. HOW EFFECTIVE IS OUR CURRICULUM, AND HOW DO WE KNOW?**

**A. Make a case with evidence that there are no curricular barriers to completion. Review data related to course retention rates, course success rates, and the frequency with which courses are scheduled to identify barriers to program completion and transfer pathways.**

*Suggested/possible points to consider:*

* *FOS only: Given that FOS courses are defined by the state; what actionable barriers are seen?*
* *For Core only: Do all course options have sufficient enrollment to continue their inclusion in core?*
* *For Core and FOS certificates: What steps can be taken to improve course completion/success rates, course enrollment, and scheduling frequencies for specific courses?*
* *Program course retention and success rates: Attach the relevant information from the Program Review Data Set on the Institutional Research Office’s intranet page.*
* *Identify and discuss all courses that have a retention rate below 78% (Carl Perkins’ standard).*
* *Using assessment evidence and instructor observations, identify the student learning outcomes that are the greatest challenges for students. Identify any additional barriers to student success.*

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| ***FOS only: Given that FOS courses are defined by the state, what actionable barriers are seen?*** The Civil Engineering, Mechanical Engineering, and Electrical Engineering FOS programs are all regulated by the Texas Higher Education Coordinating Board (THECB). All three FOS programs have been suspended by the THECB and are no longer options for students to select, effective January 2024. There is no current timeline for reinstituting the program. ***For Core and FOS certificates: What steps can be taken to improve course completion/success rates, course enrollment, and scheduling frequencies for specific courses?*** The engineering course enrollment has been increasing exponentially. In this most current academic year (AY2023/2024), the department has run a section of ENGR2332: Mechanics of Materials in both the fall and spring semesters for the first time. The ENGR2302: Dynamics course has increased enrollment from 9 students to 22 students, and the ENGR2301: Mechanics 1 (Statics) course ran two sections, one completely full at 24/24 seats filled and the other nearly full, with 19/24 seats filled. The program is in demand and thriving.  |

**B. Show evidence that the state standard for award completion has been met.**

**Completers Standard: Average 25 completers over the last five years or an average of at least five completers per year.**
Number of completers: 164 in last five years.
If below the state standard, attach a plan for raising the number of completers by addressing barriers to completion and/or by increasing the number of students enrolled in the program. Definition of completer—a student who has received an award.

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| ***Completers Standard:*** Considering all three engineering FOS programs, as well as the legacy Engineering-FOS, there have been an average of 19 FOS completers and 13 AS completers over the last five years.

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| Awards for Mechanical Engineering, Civil Engineering, Electrical Engineering, and Engineering FOS |
| 2018-2019 | 2019-2020 | 2020-2021 | 2021-2022 | 2022-2023 | Total |
| 29 | 20 | 12 | 17 | 17 | 95 |

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| Awards for Mechanical Engineering, Civil Engineering, Electrical Engineering, and Engineering AS |
| 2018-2019 | 2019-2020 | 2020-2021 | 2021-2022 | 2022-2023 | Total |
| 16 | 17 | 14 | 9 | 13 | 69 |

Source: Certified Awards, Institutional Records Office, J:\\IRO\Robinson\Data\Katherine Hedberg - ENGR Program CompletersThis metric is complicated by several factors. First, the Civil Engineering, Mechanical Engineering, and Electrical Engineering FOS programs were newly implemented at the beginning of this program review cycle (AY2018-2019). Some time to bring advisors and students up to date with the new options is to be expected. Second, the majority of engineering program completers during this time were enrolled in the Engineering FOS program, suspended prior to AY 2018-2019. Considering any of the new tracks for engineering, including Civil Engineering, Mechanical Engineering, and Electrical Engineering FOS, without the legacy Engineering FOS will yield an incomplete picture of the program. Third, students who complete either the Civil Engineering FOS or the Mechanical Engineering FOS remain competitive for transfer and admission into either program at a four-year institution. In fact, variation between FOS programs, particularly between the Civil Engineering FOS and the Mechanical Engineering FOS programs comes down to a single course. There were multiple students in the AY2022-2023 who completed the Mechanical Engineering FOS program, but transferred into a civil engineering program at their four-year university (source: personal communication, Professor Katherine Hedberg). |

**C. For any required program courses where there is a pattern of low enrollment (averaging fewer than 15 students), explain your plan to grow enrollment.**

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| None of the required courses have low enrollment. |

**D. Make a case with evidence that the program is well-managed.**

*Suggested/possible points to consider**(Data can be found at* [**http://inside.collin.edu/institutionaleffect/Program\_Review\_Process.html**](http://inside.collin.edu/institutionaleffect/Program_Review_Process.html)**):**

* Average class size
* *Grade distributions*
* *Contact hours taught by full-time and part-time faculty*
* *Identify all courses that have a success rate below 75%. Using assessment evidence and instructor observations, identify the student learning outcomes that are the greatest challenges for students in courses with low success rates. Explain what instructional and other intervention(s) might improve success rates for each identified course.*
* *Student satisfaction: What evidence do you have that students are satisfied with the program? What kinds of complaints are made to the associate dean by program students?*

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| The following tables show that the Civil Engineering, Mechanical Engineering, and Electrical Engineering FOS programs are well-managed. Enrollment has remained steady or trended up for almost every course. One exception to this is ENGR2301: Engineering Mechanics – Statics. That course showed a marked dip in enrollment from 2020 to 2021. This was precisely when COVID-19 protocols began. The trends after that dip have showed continued growth, and for the current AY 2023/2024 the department is on track for continued growth. The success rates for all engineering courses is 78% or higher, with a completion rate of over 80% for every course. Source: Colin College - Institutional Research Office http://inside.collin.edu/institutionaleffect/Program\_Review\_Process.html |

[x] **6. How effectively do we communicate, and how do we know?**

**A. Make a case with evidence that the program literature and electronic sites are current, provide an accurate representation of the program, and support the program’s recruitment plan, retention plan and completion plan.**

*Suggested/possible points to consider:*

* *Demonstrate how the program solicits student feedback regarding its website and literature and how it incorporates that feedback to make improvements.*
* *How does the program ensure that students are informed/aware of program literature? Is program literature made accessible to all students (i.e. can they obtain the information they need)?*
* *Designate who is responsible for monitoring and maintaining the program’s website, and describe processes in place to ensure that information is current, accurate, relevant, and available.*

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| The Mechanical Engineering FOS, Civil Engineering FOS, and Electrical Engineering FOS programs are all listed on the Collin College website, therefore the programs’ information is available to all current and potential students. Within the department website, students can follow links to get more information on the expected course progression, transfer pathways, and department activities, among other topics.The department also added two new positions in 2023, a recruiter and an academic advisor. These two people have helped streamline information dissemination, provide program-specific advising for students, and maintain a department social media presence.Source: Engineering Department – Collin College <https://www.collin.edu/academics/programs/FOS_Eng_1Overview.html> |

**B. In the following Program Literature Review Table, document that the elements of information listed on the website and in brochures (current academic calendars, grading policies, course syllabi, program handouts, program tuition costs and additional fees, description of articulation agreements, availability of courses and awards, and local job demand in related fields) were verified for currency, accuracy, relevance, and are readily available to students and the public. Please fill out the table only for this prompt (B.), no analysis is necessary here.**

**Program Literature Review Table**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Title | Type (i.e. URL, brochure, handout, etc.) | Date of Last Review/Update |  | Responsible Party |
| Engineering, Computer Science, and Engineering Technoligoy Department Website | URL, https://www.collin.edu/department/engineering/ | 2023 | [x] Current[x] Accurate[x] Relevant[x] Available | ENGR/COMP SCI/EET/RAT/BMET Department |
| Engineering Department Website | URL, https://www.collin.edu/department/engineering/engineeringtransfer.html | 2023 | [x] Current[x] Accurate[x] Relevant[x] Available | Engineering Department |
| Collin College – Course Catalog 2023-2024 | URL, https://www.collin.edu/academics/pdf/2023-2024%20Collin%20College%20Catalog.pdfCourse Descriptions (ENGR 1201, 2301, 2302, 2332, 2305, 2301) | 2023 | [x] Current[x] Accurate[x] Relevant[x] Available | Full-time faculty submit to the Director and administration to get changes approved and implemented. |
| Collin College – Course Catalog 2023-2024 | URL, https://www.collin.edu/academics/pdf/2023-2024%20Collin%20College%20Catalog.pdfMechanical Engineering Field-of-Study, Civil Engineering Field-of-Study, and Electrical Engineering Field-of-Study program | 2023 | [x] Current[x] Accurate[x] Relevant[x] Available | Collin College Administration |
| Marketable Skills – Electrical Engineering | https://www.collin.edu/academics/programs/MrktSkills\_ElectricalEng.html | 2023 | [x] Current[x] Accurate[x] Relevant[x] Available | Engineering department |
| Marketable Skills – Mechanical Engineering | https://www.collin.edu/academics/programs/MrktSkills\_MechanicalEng.html | 2023 | [x] Current[x] Accurate[x] Relevant[x] Available | Engineering department |
| Marketable Skills – Civil Engineering | https://www.collin.edu/academics/programs/MrktSkills\_CivilEng.html | 2023 | [x] Current[x] Accurate[x] Relevant[x] Available | Engineering department |
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[x] **7. How well are we leveraging partnership resources and building relationships, and how do we know?**

**Partnership Resources: On the table below, list any business, industry, government, college, university, community, and/or consultant partnerships, including internal Collin departments, to advance the program outcomes.**

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| The table below lists current agreeents and partnerships that the department has to support Mechanical Engineering FOS, Civil Engineering FOS students, and Electrical Engineering FOS students and further program outcomes. There are also agreements in place for chemical engineering students; these are not listed here, but also support our engineering students. |

 **Partnership Resources Table**

|  |  |  |  |
| --- | --- | --- | --- |
| Partner/Organization | Description | Formal Agreement Duration, if any. | How is it Valuable to the Program? |
| University of Texas at Arlington (UTA) | Formal transfer pathway for Civil Engineering FOS students to transfer coursework to UTA | Expires May 2026 | This agreement is tremendously valuable, as UTA is one of only two civil engineering programs in the Dallas-Ft Worth metroplex. This ensures that students can use the credits earned in the Civil Engineering FOS program at Collin College to earn a four-year degree in civil engineering at UTA.   |
| University of Texas at Tyler (UT-Tyler) | Formal transfer pathway for Mechanical Engineering AS, Civil Engineering AS, and Electrical Engineering AS students to transfer coursework to UT-Tyler | No expiration date | As above, this agreement is tremendously valuable, as UT-Tyler accepts the AS coursework for all three engineering speciaties at Collin College, as well as students with a chemical engineering emphasis. This ensures that students can use the credits earned in the Mechanical Engineering, Civil Engineering, and Electrical Engineering AS programs at Collin College to earn a four-year degree in any of those engineering specialties at UT-Tyler.   |
| University of Texas at Dallas (UTD) | Texas Common Course Numbering System (TCCNS) Transfer for Electrical Engineering FOS and Mechanical Engineering FOS students | No expiration date | All students must earn a four-year degree to work as an engineer, so these partnerships are pivotal to the professional success of the department’s students. |
| University of North Texas – Denton (UNT) | Texas Common Course Numbering System (TCCNS) Transfer for Electrical Engineering FOS and Mechanical Engineering FOS students | No expiration date | All students must earn a four-year degree to work as an engineer, so these partnerships are pivotal to the professional success of the department’s students. |
| Texas A&M University (TAMU) Engineering Academy | Partnership with TAMU to provide the first two years of engineering coursework at the Allen Technical Campus of Collin College. | Inaugural academic year 2024-2025, extends through May 2026. | This has some value, as it supports engineering students in the community as they pursue their four-year engineering degrees. |
| Texas State University (TXST): Electrical Engineering  | Click or tap here to enter text. | Expires May 2029 | Click or tap here to enter text. |
| Society of Women Engineers (SWE) | The student chapter of this professional organization provides access to working industry professionas at various events throughout the semester. | No expiration date | This organization offers students many professional development and networking opportunities throughout the academic year. These include mock interview sessions, resume workshops, and facility tours. |
| Enineering and Engineering Technology Career Fair | An annual career fair offered by the ENGR, EET, RAT, and BET departments for engineering and engineering technology students only. The event includes industry representatives with current job and internsip openings (typically 15-20 companies are invited), as well resume workships, LinkedIn help from the College’s career center, and mock interviews. | Click or tap here to enter text. | These events have yielded job offers, interviews, and internship placement for students each year. It also helps prepare students for professional events and job searches beyond the companies present at the event. |
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[x] **8. What professional developmental opportunities add value to your program?**

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| The faculty in the engineering department prioritize professional development, as seen in the table below. |

**Provide a List of professional development activities employees have participated in since the last program review.**

 **Employee Resources Table\*\***

|  |  |  |  |
| --- | --- | --- | --- |
| Employee Name | Role in Unit | Professional Development Summary | How is it Valuable to the Unit? |
| Tripat Baweja  | FT Faculty  | Attended Communication Cues Live Webinar Series: “Counteract Conditioned Thinking”, “Positive Non-Verbals”, “Assert Yourself with Empathy”, Society of Women Engineers, July 2019 "Innovations in Additive Manufacturing: Landscape and New Solutions", Live online seminar by SWE (Society of Women Engineers), 8/15/2019 Attended Professional Development meeting and tour of Frito-Lay/PepsiCo Research Facility in Plano, hosted by Dallas Society of Women Engineers, 8/27/2019 | These activities helped with better class management and student interactions. It also helped in discussions about recent technologies and real-life engineering applications in the classroom  |
| Katherine Hedberg  | FT Faculty | ATC Design Guide 2, Basic Wind 6/2/21 Engineering for Low-Rise Buildings Embankments, Dams and Slopes Technical Committee Presentation on Impacts of Recent Extreme Events; Ignacio Harrouch, PE, Ben Leshchinsky, Ph.D., PE, M. ASCE, Daniel Pradel, Ph.D., PE, M. ASCE, Joseph Wartman, Ph.D., PE – ASCE continuing education 2/24/2022 Attended Collin College Spring 2022 faculty development conference including: Spring 2022 Faculty Development Conference, attended: Why Paying Careful Attention Matters, Linda Sears. 1/6/22 Design and Construction of Water and Wastewater Facilities, by David Eastwood, offered through ASCE (American Society of Civil Engineers, Texas Section) Professional development hours (PDH) earned. 7/28/2022 Attended web seminar outlining updates to NAVFAC DM 7.1 (pivotal resource for practicing engineers, design manual resource), 9/29/2022 Collin College, Spring 2023 Faculty Development Conference, 1/5/23, including:  The Triple A's: Creating Assignment Assessments that Align! Les Stanaland, Linda Sears, Alicja Usarek, Kevin Suber, Sudha Madhugiri, Serena Richards, 10:00-10:50am Never Ending Challenge: Student Engagement, Tripat Baweja, 11:00-11:20am The Importance of an Organized Canvas Presence; N. Marlo Ballard, Benedict Nguyen-Lee, 11:30-11:50am GEOSTRATA (offered by American Society of Civil Engineers, Geotechnical Engineering Institute) Extra S04 E02 session, Remote Sensing, with Demetrios Zekkos (UC Berkeley) May 4, 2023, 1:00pm – 2:00pm Invited reviewer for annual international conference. Reviewed two state-of-the-art papers. June 2023  | These workshops, webinars, and conferences were valuable for several reasons. First, they helped ensure that course material remained targeted to current civil engineering industry practice. Second, they provided practical applications of academic concepts that could be woven into engineering courses. Third, targeted teaching workshops helped to improve (a) engagement in the classroom in these highly technical courses and (b) overall Canvas presence.    |
| Krishna Aryal | PT Faculty | -Attended Collin College Spring 2022 faculty development conference, including: Spring 2022 Faculty Development Conference, attended: Why Paying Careful Attention Matters, Linda Sears. 1/6/22 - Completed “STOP THE BLEED COURSE” to get CPR certification 11/11/2020  - Completed QM Rubric certification 04/09/2020 - Completed “Team Based Learning (TBL) certification 05/28/2023  | These workshops/certifications helped with engagement in the classroom in highly technical courses. It also helps students' safety and interactions.  |
| Zhiquang Wang  | FT Faculty | 2/10-13/2019, Solidworks World 2019, Dallas, TX; 8/20/2019: Solidworks Simulation Solutions, vitual, webinar; 2/9-12/2020: 3DExperience World 2020, Nashville, TN; 2/19/2020: Introduction to Solidworks Visualize, Webinar, MLC; 9/22-23/2020: Additive Manufacturing for Aerospace, Lighting Talk & Virtual Lab Series, MakerBot; 11/17-20/2020: Autodesk University 2020, Digital Conference; 1/12-14/2021: Solid Edge Fundamental Training, online training; 3/11/2021: The Shredder: Understand the Simulation, Solidworks Live Design webinar, Dassault System; 10/5-14/2021: Autodesk University 2021, Digital Conference; 2/7/-2/9/2022: 3DExperience World, virtual conference; 6/22/2022: 3DExperience Data Management, MLC CAD systems, webinar; 9/14/2022: Smart manufacturing 101 webinar, Delmiaworks. 9/27/2022: Autodesk University Conference, virtual conference.  11/30/2022: 3DExperience Simulations webinar, MLC CAD systems. 3/1/2023: Introduction to SolidWorks API, MLC CAD Systems 7/12/2023: Working with Scanned Data in Solidworks. MLC CAD Systems. 8/16/2023: Solidworks Flow Simulation CFD Tips & Tricks. MLC CAD Systems. 11/13/2023: Autodesk University Conference, virtual conference.  | These conferences/webinars  provide valuable information on recent developments in engineering design/graphics area, which helps the development of our engineering graphics course at the college.  |
| Susan Stancy Abraham  | FT Faculty | Applying the Quality Matters Rubric APPQMR workshop (12/15/2020 ‐ 12/16/2020) Collin College Faculty Development Conference Spring 2021: * Plenary Session: "The Hidden Learning Disability of Anxiety, Stress, and Trauma: Science and Strategies for Improving Learning" by Dr. Janet Zadina

Solid Edge Fundamentals Training ﴾01/12/2021 ‐ 01/13/2021﴿ WE 21 - National Conference of the Society of Women Engineers, virtual event (Oct. 21-23,2021) * Session: “Letting Others Lead” – Barbara Humpton, CEO, Siemens USA.
* Session: Empowering Women through P.I.E • I gained insight into the three aspects of Performance, Image, and Exposure in an organization.

Collin College Spring 2022 Faculty Development Conference  * Keynote: Powerful teaching – Unleashing the Science of Learning, Dr. Pooja K. Aggarwal
* Session: Thinking, Teaching and Assessing Across Disciplines • I was introduced to and inspired by the concept of a cross-discipline learning community, where students and professors from two different courses came into a single learning environment and learned from each other.
* Session: Adventures in Assessment • This session introduced me to innovative cross-disciplinary assessment strategies.
* Session: Beat the Cheat – Ensuring Academic Integrity in Online Classrooms • This session taught me how to prevent cheating by changing assessment formats.

Center for Teaching and Learning Session: Easier Grading and meaningful evaluation through rubrics (Feb 2022)  Collin College Fall 2023 Faculty Development Day:  * “Reducing student resistance leads to better learning and happier faculty” – Dr. Anton Tolman, Utah Valley University.

WE 22 - The Society of Women Engineers (SWE) national conference at Houston – Oct 20-22, 2022 Collin College Spring 2023 faculty development conference: * “Using Breakout Activities to Increase Student Engagement” by Stephen Gonzales
* “Transactional Grace & Accountability in the Post-COVID Classroom” by Ryan Farrar
* “Virtually Prepared: Presentation Practice for Your Students Using Virtual Reality” Whitney Pisani, Jenny Warren
* “Using Perusall for Collaborative Reading Assignments” Rebecca Orr

SWE local conference in Seattle (Mar 31-April 1, 2023) This was a regional conference held by the Society of Women Engineers. I attended multiple sessions by leading tech and engineering companies like Space X, Microsoft, Toyota, SoCal Gas, and Amazon.  | These conferences and webinars were useful in enhancing my knowledge of the current trends in Civil  Engineering, and improving pedagogical methods and student engagement.  |
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 \*\*For convenience, if providing a listing of professional development activities, this list may be included in this document as an appendix.

[x] **9. Are facilities, equipment, and funding sufficient to support the program? If not, please explain.**

**[OPTIONAL—Only respond to prompt 9 if you are requesting improved resources for your program. If current facilities and budget are adequate, please proceed to prompt 10.]**

**Make a case with evidence that current deficiencies or potential deficiencies related to facilities, equipment, maintenance, replacement, plans, or budgets pose important barriers to the program or student success.** As part of your response, complete the resource tables, below, to supportyour narrative.

*Possible points to consider:*

* *The useful life of structure, technologies and equipment*
* *Special structural requirements*
* *Anticipated technology changes impacting equipment sooner than usual*
* *If you plan to include new or renovated facilities or replacement of equipment in your Continuous Improvement Plan, be sure to provide qualitative and/or quantitative data evidence of the need in this section.*

|  |
| --- |
| No additional facilities or budget are being requested at this time. The department has identified areas with opportunities for growth in course offerings, lab equipment, and program partnerships. These will be explored independently by the department, as all three engineering FOS programs have been suspended by the state at this time. |

**Facilities Resources Table\*\***

|  |  |  |  |
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| Significant Pieces of Equipment | Description (i.e. Special Characteristics) | Meets Needs (Y or N):Current For Next 5 Years | Analysis of Equipment Utilization |
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**Equipment/Technology Table ($5,000 or more) \*\***

|  |  |  |  |
| --- | --- | --- | --- |
| Current Equipment Item or Budget Amount | Description | Meets Needs (Y or N):Current For Next 5 Years | For any “N”, justify needed equipment or budget change |
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**Financial Resources Table\*\***

|  |  |  |  |
| --- | --- | --- | --- |
| Source of Funds(i.e. college budget, grant, etc.) | Meets Needs (Y or N):Current For Next 5 Years | For any “N”, explain why | For any “N”, identify expected source of additional funds if needed |
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Section III.Continuous Improvement Plan (CIP)

[ ] **10. How have past Continuous Improvement Plans contributed to success?**

Program Review at Collin College takes place for each award-issuing program every five years. During the last (fifth) year, the program evaluates the data collected during the CIP process.

**Please describe how you have used your Continuous Improvement Plan (CIP) to make the following improvements to your program over the past 4 years (your last program review can be found on the Program Review Portal):**

* 1. **Program Learning Outcomes/Program Competencies**
	2. **Overall improvements to your program**

|  |
| --- |
| The engineering faculty and our director meet at least twice yearly to discuss what is working well and what needs improvement within our department. These discussions produce areas of interest, and those areas are where the CIP plans are focused. See Appendices M through P for all CIPs. In year 1, there was a single Engineering FOS, and thus data for Mechanical Engineering (ME), Civil Engineering (CE) and Electrical Engineering (EE) FOS programs cannot be separated out. Instead, the year 1 CIP targets have been outlined below with the course used to evaluate the metric.The year 3 CIP identified four outcomes for the Mechanical Engineering FOS program, four outcomes for the Civil Engineering FOS program, and four outcomes for the Electrical Engineering FOS program. In year 1, the metrics were: 1. Explain Engineering Design process and perform documentation of the process (ENGR1201)
2. Analyze a static system involving equilibrium of rigid bodies subjected to a system of forces, moments, and friction using free body diagrams (ENGR2301)
3. Analyze a dynamic system using equation of motion, and principles of work and energy (ENGR2302)
4. Perform transient analysis and steady state analysis of DC and AC circuits (ENGR2305)
5. Demonstrate proficiency in creating engineering drawings with 2D and 3D views using advanced CADD (ENGR1304)

In year 3, the metrics for each FOS were: 1. Students will be able to apply principles of physics to analyze forces acting on stationary engineering structures and systems. (ME FOS, CE FOS)
2. Students will be able to analyze engineering structures and systems involving the motion of particles and rigid bodies. (ME FOS, CE FOS)
3. Students will be able to perform stress, strain and deformation analysis of engineering structures and systems. (ME FOS, CE FOS)
4. Students will be able to create engineering drawings using industry software. (CE FOS)
5. Students will be able to perform analysis of DC/AC circuits. (ME FOS, EE FOS)
6. Students will be able to design simple engineering systems using an engineering design process and document this process. (EE FOS)
7. Students will be able to model electrical circuits using industry standard simulation software to analyze the behavior of voltage and current within circuits and to compare with experimental observations. (EE FOS)
8. Students will be able to write software programs using a programming language. (EE FOS)

All targets were met for both the year 1 and 3 CIP goals. Since the Mechanical Engineering FOS, Civil Engineering FOS, and Electrical Engineering FOS programs did not exist at the time of the last program review, a direct comparison cannot be made. However, one of the goals of the last program review was to put in place Mechanical Engineering, Civil Engineering, and Electrical Engineering FOS pathways, this that goal was achieved. There are general improvements within the department that have been made over the past four years, including: * A new career coach and dedicated engineering advisor was hired. This significantly improved student outcomes, advising, and time to graduation.
* Three of four targeted engineering specialties were implemented within the engineering department
* Increased enrollment in the engineering department/specialties

The CIP data has helped the department to improve within the last four years in several ways, including:* Identified need for better communication between full-time faculty and adjunct faculty. This has been improved by designating full-time faculty members responsibility for specific courses.
* Improved assignments that link academic work to an application in industry. This better prepares students for internships and jobs, and helps students better understand how classwork will translate to professional work.
* Improved timing on assignments. At least one course (ENGR1201) is assignment heavy, and student feedback indicated that more time between major assignments would be helpful.

These improvements have helped the engineering department better support our students through communication, guidance, and targeted improvements to course assignments. |

**\*Please attach previous CIP Tables in the appendix**

[x] **11. How will we evaluate our success?**

**NOTE: Please contact the institutional effectiveness office if you need assistance filling out the CIP tables.**

As part of the fifth year Program Review, the program should use the observations and data generated by this process along with data from other relevant assessment activities to develop the program’s CIP and an action plan for the next two years. At the conclusion of the first two years, data collected from the first year, plus any other relevant data that was collected in the interim, should be used to build on the accomplishments of those first two years by developing another two-year action plan for the CIP to help the program accomplish the expected outcomes established in its CIP or by implementing one of your other plans.

**Based on the information, analysis, and discussion that have been presented up to this point, summarize the strengths and weaknesses of this program. There should be no surprise issues here! This response should be based on information from prior sections of this document. Describe specific actions the faculty intends to take to capitalize on the strengths, mitigate the weaknesses, improve student success and program learning outcomes.** **Provide the rationale for the expected outcomes chosen for the CIP(s).**

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| ***Department strengths:***The engineering department has leveraged strong working relationships with universities across the state of Texas to create multiple formal agreements and partnerships. These agreements have helped students to succeed as they pursue their four-year degree by ensuring that the courses they take at Collin College transfer seamlessly. The pathways also ensure that no time is wasted as students pursue their degree (i.e., no unnecessary courses are taken).The engineering department has also worked hard to provide (a) community within the program and (b) opportunities for professional development within the student body. The chapter of the Society of Women Engineers (SWE) regularly interfaces with local industry partners, providing students with direct access to professional engineers for networking, career opportunities, and advice. The Robotics Club offers a chance for like-minded students to work together on projects involving mechanical and electrical engineering concepts, as well as basic computer programming. The department also hosts annual targeted career fairs for engineering and engineering technology students. These events bring in local industry partners who are actively hiring, providing opportunities for students to land internships or job offers while studying at Collin College. Workshops are also provided during these events, including resume reviews, mock interviews, and LinkedIn profile help. ***Department weakness:***A weakness of the program has been ensuring that students take the correct courses at the right time. This is pivotal; unless students are slotted into the correct math and science courses from the first semester, they cannot finish an engineering in four years. In the past, students were incorrectly advised regarding course selection and credits earned at Collin College with some regularity, as general advisors were not always aware that engineering students needed to begin their math and science sequences immediately. The engineering department has been working to mitigate this issue for several years. The department has recently added a career coach and dedicated engineering advisor. This has improved the situation for existing and incoming students.***CIP targets for next cycle:***As discussed in Section 10, current CIP targets were met or exceeded for the last four years. As a result, the faculty have developed new metrics to isolate several pivotal learning outcomes for the program.First, students must be able to apply principles of physics to analyze forces acting on stationary engineering structures and systems. This can be checked by examining whether students are (a) comfortable drawing a free-body diagram and (b) are proficient at using that diagram to develop sets of equations – at this stage in the program, that will be equations of equilibrium. These skills are of paramount importance for both the Civil Engineering and the Mechanical Engineering FOS programs, and so will be shared between the programs. Second, students will be able to compare hand calculations to numerical simulations of a static analysis of a beam. To ensure this, professional communication and critical thinking will be examined through comparison of hand calculations and numerical simulations of basic static analysis. This will allow faculty to ascertain the level of professional communication students currently achieve in the program. If targets are not met here, faculty plan to add exercises targeting development of technical communication within the existing course framework.Third, electrical engineering students will be able to perform analysis of AC circuits, as well as model electrical circuits using industry standard simulation software to analyze the behavior of voltage and current within circuits and to compare with experimental observations. Faculty will use two different metrics – a quiz and a lab exercise – to ensure that students are meeting those key learning outcomes.  |

[x]  **12. Complete the Continuous Improvement Plan (CIP) tables that follow.**

Within the context of the information gleaned in this review process and any other relevant data, identify program priorities for the next two years, **including at least one program learning outcome (or program competency)**, and focus on these priorities to formulate your CIP. You may also add short-term administrative, technological, assessment, resource or professional development outcomes as needed.

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| Please see the tables below for Continuous Improvement Plan (CIP) targets. |

**Table 1. CIP Outcomes, Measures & Targets Table (focus on at least one for the next two years)**

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| **A. Expected Outcomes**Results expected in this unit(e.g. Authorization requests will be completed more quickly; Increase client satisfaction with our services) | **B. Measures**Instrument(s)/process(es) used to measure results(e.g. sign-in sheets, surveys, focus groups, etc.) | **C. Targets**Level of success expected(e.g. 80% approval rating, 10 day faster request turn-around time, etc.) |
| Students will be able to apply principles of physics to analyze forces acting on stationary engineering structures and systems. | An assignment requiring static analysis of a beam with correct (a) development of a free-body diagram and (b) application equations of equilibrium (ENGR 2301) | Min. 75% on the assessment by 80% of the students |
| Students will be able to compare hand calculations to numerical simulations of static analysis of a beam. | An assignment requiring comparison of hand calculations with numerical simulations using the software (MechaniCalc) (ENGR 2301) | Min. 75% on the assessment by 80% of the students |
| Students will be able to perform analysis of AC circuits  | Quiz focusing on AC circuit analysis (ENGR2305) | 70% of students will earn a grade of 70% or better on indicated measure |
| Students will be able to model electrical circuits using industry standard simulation software to analyze the behavior of voltage and current within circuits and to compare with experimental observations. | Lab exercise on transient analysis using circuit simulation software (ENGR 2105) | 70% of students will earn a grade of 70% or better on indicated measure |

**Continuous Improvement Plan**

**Outcomes might not change from year to year. For example, if you have not met previous targets, you may wish to retain the same outcomes. *You must have at least one program learning outcome.* You may also add short-term administrative, technological, assessment, resource or professional development goals, as needed. Choose 1 to 2 outcomes from Table 1 above to focus on over the next two years.**

**A. Outcome(s)** -Results expected in this program (from column A on Table 1 above--e.g. Students will learn how to compare/contrast Conflict and Structural Functional theories; increase student retention in Nursing Program).

**B. Measure(s)** –Instrument(s)s/process(es) used to measure results (e.g. results of essay assignment, test item questions 6 & 7 from final exam, end of term retention rates, etc.).

**C. Target(s)** -Degree of success expected (e.g. 80% success rate, 25 graduates per year, increase retention by 2% etc.).

**D. Action Plan** -Implementation of the action plan will begin during the next academic year. Based on analysis, identify actions to be taken to accomplish outcome. What will you do?
**E. Results Summary** - Summarize the information and data collected in year 1.
**F. Findings** - Explain how the information and data has impacted the expected outcome and program success.
**G. Implementation of Findings** – Describe how you have used or will use your findings and analysis of the data to make program improvements.

 **Table 2. CIP Outcomes 1 & 2**

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| 1. **Outcome #1** Students will be able to apply principles of physics to analyze forces acting on stationary engineering structures and systems.
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| 1. **Measure (Outcome #1)**

An assignment requiring static analysis of a beam with correct (a) development of a free-body diagram and (b) application equations of equilibrium (ENGR 2301) | 1. **Target (Outcome #1)**

Min. 75% on the assignment by 80% of the students |
| 1. **Action Plan (Outcome #1)**

Faculty will create a grading rubric to be used for all sections of the course. This rubric will divide points to quantify skills associated with (a) drawing a free-body-diagram (e.g., clear vector representation of all forces, labels for all dimensions, etc.) and (b) correct application of equations of equilibrium. |
| 1. **Results Summary (Outcome #1) TO BE FILLED OUT IN YEAR 2**
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| 1. **Findings (Outcome #1) TO BE FILLED OUT IN YEAR 2**
 |
| 1. **Implementation of Findings (Outcome #1) TO BE FILLED OUT IN YEAR 2**
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**Table 2. CIP Outcomes 1 & 2 (continued)**

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| 1. **Outcome #2** Students will be able to model electrical circuits using industry standard simulation software to analyze the behavior of voltage and current within circuits and to compare with experimental observations.
 |
| 1. **Measure (Outcome #2)**

Lab exercise on transient analysis using circuit simulation software (ENGR 2105) | 1. **Target (Outcome #2)**

70% of students will earn a grade of 70% or better on indicated measure |
| 1. **Action Plan (Outcome #2)**

Faculty will develop a lab exercise that captures key aspects of transient analysis using circuit simulation software. This lab will be graded in every section with a common rubric, to ensure accurate comparative scores for all students. |
| 1. **Results Summary (Outcome #2) TO BE FILLED OUT IN YEAR 2**
 |
| 1. **Findings (Outcome #2) TO BE FILLED OUT IN YEAR 2**
 |
| 1. **Implementation of Findings (Outcome #2) TO BE FILLED OUT IN YEAR 2**
 |

**What happens next? The Program Review Report Pathway**

1. **Following approval by the Steering Committee,**
* Program Review Reports will be evaluated by the Leadership Team;
* After Leadership Team review, the reports will be posted on the Intranet prior to fall semester;
* At any point prior to Intranet posting, reports may be sent back for additional development by the unit.
1. **Unit responses to the Program Review Steering Committee recommendations received before July 31st will be posted with the Program Review Report.**
2. **Leadership Team members will work with program supervisors to incorporate Program Review findings into planning and activity changes during the next five years.**

**Please make sure to go back and complete your Executive Summary at the start of the Review.**