2023 Annual Conference & Exposition
Baltimore Convention Center, MD | June 25 - 28, 2023
The Harbor of Engineering Education for 130 Years
Paper ID #36900

What's in a Name? General, Interdisciplinary, and Integrated Engineering Programs

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What's in a Name? General, Interdisciplinary, and Integrated Engineering Programs

Abstract

This study explored differences and similarities among undergraduate engineering programs named general, engineering, interdisciplinary, and integrated. Benchmarking these non-specialty programs was conducted using information from course catalogs and websites. Many of these ABET EAC-accredited programs only a awarded a very small number of Bachelor's degrees in 2022 or 2021. The majority of the non-specialty programs required students to select a concentration, generally in a traditional engineering discipline (e.g., mechanical) but in some programs these were unique interdisciplinary areas (e.g., renewable energy). Based on the 2022 catalogs, the total number of credits did not differ statistically among the non-specialty ABET EAC accredited programs with different names. On average across 35 institutions, the non-specialty degrees required 1.4 fewer credits than disciplinary engineering degrees at those same institutions. Among a smaller number of ABET EAC accredited non-specialty degrees that were benchmarked in more detail, 19 'engineering' and 'general engineering' degrees required a lower percentage of technical coursework and offered a lower percentage of curricular choice compared to 7 degrees that included the word interdisciplinary, integrated, or multidisciplinary in their name. A few programs require students to take the NCEES Fundamentals of Engineering (FE) exam prior to graduation. The AI-based program ChatGPT definitions of general, interdisciplinary, and integrated all emphasized breadth, multiple disciplines, and design, while also including the distinguishing factors of practical (for general) versus complex and innovative/ novel (interdisciplinary and integrated), and the importance of social impacts (integrated). Various types of content analyses were conducted based on how these programs are described on their websites; differences among the program name groups were not identified but the corpora were too small for robust analysis. Overall the paper provides enhanced understanding of the goals and curricula of these non-disciplinary engineering degree programs. This may be helpful as programs consider suitable names for non-specialty engineering degrees.

Background

There is a need for students to "gain the confidence and competence required to enter an increasingly complex and diverse engineering industry" [1]. A recent 'Engineering 2035' effort in Australia [2, p. 34] "foresaw greater diversity of engineering work" characterizing it as "increasingly complex and multidisciplinary" and "privileg(ing) life cycle and societal considerations." To meet these demands, some promote an engineering education that will develop T-shaped engineers [3], [4], which includes a breadth of skills and attitudes in addition to the traditional specialized technical depth. This skill set increases an individual's employability by crossing disciplinary lines and better preparing them to adapt to an array of situations.

The skills and attitudes that are important for engineers may be optimally fostered through engineering degrees outside of specialty areas (e.g., mechanical, civil, electrical, chemical, and others). The National Academy of Engineering (NAE) acknowledged a tension between breadth and specialization in its *Educating the Engineer of 2020* report [5, p. 125], noting "The questions of… how much specialization there should be at the undergraduate level, how to prepare students for careers that include both technical and managerial tracks, and how to meet the needs and expectations of society all seem timeless." This tension is echoed in a more recent 2018 NAE report [6]. Bear and Skorton [7] state, "the notion that disciplinary specialization and technical depth are the only important prerequisites for employment turns out to be false." King and Pister [8] also advocate for broadening engineering Bachelor's degrees, and present a variety of ideas to achieve this aim.

According to data from the American Society for Engineering Education (ASEE) [9] only a small number of students earned engineering Bachelor's degrees outside of specialty areas; in 2021, there were 1988 Bachelor's in engineering (general) awarded out of 145,312 across engineering (1.37%). This percentage of degrees awarded in engineering (general) was lower in 2021 compared to 2010-2011 at 1.77% [10]. When the ASEE specifically looked at smaller programs in 2016 [11], engineering (general) had the 7th highest number of Bachelor's graduates among engineering disciplines (the exact number of degrees not readily apparent from the bar graph), compared to the 14th highest among all programs in 2016 (1.2% of all degrees) [12]. This implies that smaller institutions may more commonly offer non-specialty engineering degrees. The number of students pursuing non-specialty engineering degrees are typically smaller than disciplinary degrees. The list of the top 50 institutions by total Bachelor's degrees awarded in engineering (general) shows a range of 184 to 9 Bachelor's degrees per program [9]. By comparison, the numbers of Bachelor's degrees awarded at the top 50 institutions for mechanical was 510 to 206, electrical was 320 to 84, civil was 292 to 87, chemical 231 to 72, and industrial / manufacturing was 735 to 46 [9].

The small number of Bachelor's degrees awarded in many of these non-specialty engineering programs might be problematic at some institutions. Under tight budget constraints and concerns about declining enrollments, some of these programs might be facing pressure to attract and graduate more students. Perhaps the program names contribute to some of these challenges, leading to questions about whether rebranding to a different name might be beneficial. Other studies have explored renaming motivations and results in geography [13], agronomy [14], writing programs [15], vocational education [16], and institutions [17], [18]. There is a general consensus that names are powerful, and changes often reveal tensions with the health and/or identity of programs. Frazier et al. [13, p. 13] notes: "Do name changes reflect an expanded mission… or other goals such as addressing low enrollment, shifting student interests, or the desire to project a fresh identity or realign with a new academic emphasis?" There may also be concern about name recognition or conveying the focus or importance of a degree to the general public including prospective students and their families [16].

The names of many non-specialty engineering degree programs seem somewhat fluid. Among ABET accredited programs, name changes are readily apparent [19], with examples in Table 1. ABET viewed these as renaming rather than new program accreditation, which seems to indicate that little to no curriculum changes accompanied the name change. Exploring the websites for some of these programs also identified different ways that some of the programs described themselves (e.g., accredited degree in 'engineering' described as 'general engineering'); it is unclear if these might be 'in-progress' name changes. Programs might have names that differ from the titles of the degrees that they offer, which may have led to some of the differences that were found on the websites. Among ABET EAC accredited non-specialty programs, degree names included general engineering, interdisciplinary engineering, multidisciplinary engineering, and engineering.

Table 1. Examples of ABET EAC Accredited Program Name Changes [19]

Institution	Older Name	Newer Name
Grand Valley State University	Engineering BS 1988-1989 Engineering BSE 1989 - 2011	Interdisciplinary Engineering 2011-present
Montana Technological University	Engineering Science BS 1981-1999	General Engineering BS 1999-present *(not found in catalog)*
Muskingum University	Engineering Science BS 2011-2018	General Engineering 2019-present
Minnesota State University, Mankato	General Engineering BSE 2011-2015	Iron Range Engineering BSE 2014 – present *(website says 'Integrated Engineering' as of 2023)*
Oklahoma State University	General Engineering BS 1950-1998	*(Discontinued?)*
Pennsylvania State University	General Engineering BS 2014 - 2017	Engineering 2018 - present
University of Illinois at Urbana-Champaign	General Engineering 1936-2019	Systems Engineering and Design BS 2019 - present
University of Denver	Engineering (General) BS 1997- 2007	*(Discontinued?)*
Loyola University Maryland	Engineering Science(s) BS 1989 - 2010	Engineering BSE 2011 - present
Loyola University Chicago	Engineering Science BS 2018 - 2021	Engineering BS, 2021 - present
Southern Utah University	Integrated Engineering BS 2003 - 2011	Engineering BS 2011 - present

A new movement is emerging around the name *Integrated Engineering* with sessions held at the American Society for Engineering Education and Frontiers in Education conferences [20], [21]. Southern Utah University offered an Integrated Engineering degree [22], [23] from 2003 to 2011, whereupon the degree was renamed to Engineering (see Table 1 above). A degree program titled Integrative Engineering was recently started at Lafayette [24], in addition to the Integrated Engineering programs at Minnesota State University Mankato [20], the University of San Diego [25], and a renamed program in Integrated Design Engineering at the University of Colorado Boulder [26]. The Wikipedia site on Integrated Engineering [27] also lists a program at Lehigh University; the Lehigh program is titled B.S. Integrated Degree in Engineering, Arts & Sciences (IDEAS) [28] and is not ABET EAC accredited [19]. In addition Wikipedia lists Integrated Engineering programs outside the U.S. including two in Canada, seven in the UK, two in Germany, and three others [27]. Bear and Skorton [7] describe an 'integrative model' of education where "the knowledge, modes of inquiry, and pedagogies from multiple disciplines are brought together within the context of single courses or entire programs of study." They also note, "society is witnessing a recent surge of interest and enthusiasm for more holistic and integrative approaches in higher education." They cite Olin's engineering program as an example. The framing and nature of these programs titled integrat(ed/ive) relative to other non-specialty engineering degree programs, such as Interdisciplinary Engineering, is unclear.

Some institutions have moved from a 'general' engineering degree model (often with concentrations or specializations) to specialty degrees. The Colorado School of Mines in 2010-2011 offered [29]:

> a **design-oriented, interdisciplinary**, accredited non-traditional undergraduate program in engineering with specialization in civil, electrical, environmental or mechanical engineering. The program emphasizes fundamental engineering principles and **requires in-depth understanding within one of the four specialty areas** that are offered. Graduates are in a

> position to take advantage of a broad variety of professional opportunities, and are well prepared for an engineering career in a world of rapid technological change.

In addition, specialty engineering degrees were offered in Chemical, Chemical & Biological, Geological, Geophysical, Metallurgical & Materials, Mining, and Petroleum. By the 2016-2017 catalog [30] the Engineering degree was no longer offered but rather separate degrees in Civil, Electrical, Environmental, and Mechanical. As of 2022, a Bachelor of Science in Engineering has returned [31], offered through the Engineering, Design, & Society Department:

> The BSE is an **interdisciplinary design** engineering degree that focuses on the creation of innovative solutions to the challenging problems facing people, societies, and the world. Through a sequence of Integrated Design Studios that bridge first-year Cornerstone Design and senior-year Capstone Design, students become experts in design methods that deploy engineering principles to address human problems in real-world contexts. The BSE provides the **flexibility for students to create specialized focus areas** that suit their individual career and personal interests, and it ensures they gain practical engineering experience throughout their education at Mines.

As of January 2023 it appeared this program was renamed to Design Engineering [32].

As another example, John Brown University offered a Bachelor's of Science in Engineering with concentrations in Electrical/Computer, Mechanical, or Renewable Energy (2018-19 catalog [33]) which was discontinued and replaced with a B.S. in Electrical Engineering and a B.S. in Mechanical Engineering (renewable energy available as a minor) [34]. The reasons for the switch from a single degree with concentrations to separately titled degrees is unknown. A similar situation was identified at LeTourneau University (Engineering BS found through ABET but not visible on institution website; newer accredited degrees in civil, electrical and computer, and mechanical engineering) [13], [35].

Marketing non-specialty engineering degrees to students is likely to differ quite a bit between different institutional contexts. At small private universities and colleges, particularly those that are religiously affiliated, many students perhaps elect to come to the institution and then are seeking a major of interest. When there is only a single engineering major this choice is simple – marketing can focus on the benefits of an engineering degree at-large. Some of these institutional websites market the specializations within the engineering degree very similarly to separate majors (e.g., University of Southern Indiana, Robert Morris University) with little discussion of the overarching degree. If the institution offers an array of engineering degrees in both specialty fields and a (general) engineering degree, each degree program will try to distinguish itself from the others to help students find an experience that best matches their interests and goals. Most specialty degrees convey their focus clearly in the title – e.g., mechanical, electrical, biomedical. The presence of a 'general' engineering degree in this context might be confusing or unclear. Students and parents might have concerns about marketability – for example, the U.S. Bureau of Labor Statistics characterizes engineering career paths separately for each specialty area [36].

Interestingly, non-specialty engineering degrees are offered at each of the institutions ranked in the top three by the *US News & World Report* as the best undergraduate engineering programs at institutions where doctorate degrees are not offered [37]. This indicates that high quality non-specialty degrees are widely recognized.

- #1: Rose-Hulman Institute of Technology includes a degree in Engineering Design (not ABET EAC accredited [19]) and also the full slate of engineering specialty degrees in Biomedical, Chemical, Civil, Computer, Electrical, Mechanical, and Software
- #2: Franklin W. Olin College of Engineering includes an Engineering degree (with concentrations that are self-designed or sustainability, design, robotics, computing, or bioengineering), as well as two specialty engineering degrees in Mechanical and Electrical & Computer (all three degrees ABET EAC accredited [19]).
- #2: Harvey Mudd College only offers a degree in Engineering, none in specialty areas. Interestingly, Harvey Mudd was ranked #3 in mechanical engineering [38], #6 in civil engineering [39], and #7 in electrical engineering [40], even though they do not offer specialty degrees in these sub-disciplines.

A potential attribute of some engineering (general) degrees may be to include a higher percentage of non-technical coursework. One might suspect that liberal arts institutions in particular focus on teaching non-technical knowledge and skills, which are also valued by industry [1]. A more balanced educational experience might be particularly relevant given the large number of folks with engineering degrees who work outside of engineering occupations; the NAE estimated that as of 2013 there were 65% of all degreed engineers who worked in occupations not considered engineering [41]. The ABET EAC program criteria add additional curricular constraints on specialty degrees, with the majority of the identified aspects relating to technical issues; programs accredited under the general criteria do not face these additional restrictions [42]. Previous research quantified the amount of required technical coursework in mechanical, electrical, civil, and chemical engineering degrees [43]; across the 103 engineering programs a median of 73% of the total credits to graduate were required in technical courses (engineering, computing, math, and natural science), significantly higher than other STEM fields such as physics (55%), chemistry (54%), and math (46%). This analysis did not account for courses that have an engineering course number and integrate social, economic, communication, and other 'non-technical' topics within the course alongside technical subjects. These inter-connections or socio-technical issues are inherent in engineering design.

Curricula in engineering may be tightly controlled due to the need to teach the broad array of both technical and non-technical knowledge, skills, and attitudes required for success in practice. Many institutions have a core of required outcomes for all students which are typically embedded in an array of required humanities, arts, and social science courses (with menus of course options to fulfill particular outcomes). The need to document achievement of student learning outcomes for ABET and meet the instructional requirements of ABET program criteria, as well as regional accreditation standards that apply to all students, are likely factors that contribute to the specification of restrictive engineering curricula that limit flexibility and student choice. However, autonomy has been found to be a powerful motivator for human action, including in education [44], [45]. Autonomy and choice as a motivator in education have been primarily studied within courses. But similar effects might occur at a curricular level, with students enjoying the opportunity to select their courses versus being restricted by a rigid curriculum that offers them few options. Curricular choice in engineering has been found to be lower than other majors [46]. Perhaps removing the need to include depth in a particular specialty area opens the opportunity for non-specialty engineering degrees to offer students more choices in their courses.

Research Questions

Given this background, the research explored the following questions:

What are common characteristics and differences among engineering degrees offered under the titles of engineering, general engineering, interdisciplinary engineering, and integrated engineering? The characteristics that will be explored include:

1) Number and demographics of Bachelor's degrees awarded
2) Specializations required and available
3) Total curriculum credits required
4) Balance of technical and non-technical coursework in the curriculum; FE exam requirements
5) Percentage of the curriculum comprised of specific required courses versus allowing students choices
6) The language used to describe these degrees

Given the somewhat distinctive character of the approaches used to answer each of these questions, the manuscript will present in turn the methods, results, and some discussion on each of these topics. The work focused on programs in the U.S. and ABET EAC-accredited programs, except as noted.

Number and Demographics of Bachelor's Degrees

Method: The list of programs accredited under the EAC general criteria of ABET was acquired [19] and limited to US institutions. Degree programs were grouped into degrees titled 'engineering', 'general engineering', and 'interdisciplinary / multidisciplinary / integrated'. The 3 programs in integrated engineering were so-named in the university catalogs, despite being accredited under different names. Engineering Physics and Engineering Science degrees were intentionally excluded from the analysis. The number of Bachelor's degrees awarded in each of the non-specialty engineering programs was compiled from either College Factual [47], typically representing 2021 graduates, or 2022 data from institution websites compiled for ABET. Not all of the programs listed by ABET had awarded any Bachelor's degrees based on either source; these institutions were then removed from the dataset. At institutions with 6 or more graduates, the demographics of the Bachelor's recipients were characterized by three metrics: percentage of degrees awarded to women, percentage of degrees awarded to Hispanic / Latino students, and percentage of degrees awarded to Black / African American students. The demographics of the Bachelor's recipients for a few of the programs could not be found. Note that College Factual used the term 'general engineering' for any non-specialty degree. It is also worth noting that the programs characterized did not include all of the 'top 50 institutions by total Bachelor's degrees awarded' engineering (general) programs listed by ASEE [9]. The ASEE list included non-accredited programs (e.g., Stanford does not offer a non-specialty degree accredited under the ABET EAC general criteria) and other types of programs (e.g., Smith College offers an Engineering Science degree).

Results: The number of non-specialty engineering Bachelor's degrees awarded by individual ABET-accredited programs in Engineering, General Engineering, Integrated Engineering, Interdisciplinary Engineering, and Multidisciplinary Engineering in the U.S. were generally small (summarized in Table 2). Among the data set compiled: 41 institutions awarded 1 to 15 Bachelor's degrees, 31 institutions awarded 16-50 degrees, and only 14 institutions awarded more than 50 degrees. This included 58 private institutions (including 38 religiously-affiliated) and 28 public institutions. Given the small number of programs not named 'engineering' statistical comparisons among program name types were not conducted. The largest program was the engineering degree at Arizona State University – Polytechnic, which peaked at 207 Bachelor's degrees in 2018-2019, and in 2021-2022 had dropped to 165 [48].

Table 2. ABET EAC-accredited Non-Specialty Engineering Degrees: Number of B.S. degrees awarded per institution and demographics of degree recipients+ (minimum, median, maximum)

Degree Type	# institutions	# degrees Min–Med-Max	% degrees to females Min–Med-Max	% degrees to Hispanics Min–Med-Max	% degrees to Black Min–Med-Max
Engineering	75	2 - 17 - 165	0- 21.3 - 58.6	0- 7.1 -71.4	0- 0 - 50
General Engineering	5	2- 7 - 17	11.8 - 14.3 -30.8	0 - 3.9 -29.4	0- 0 - 17.6
Inter/multidisciplinary, integrated^	6	2 - 14.5 - 35	20.6 - 32.8 -38.9	5.9- 11.3 -28.6	0- 5.6 - 14.3
Comparison ASEE All [9]	*254*	*UNK*	*24*	*13.6*	*4.7*

^ 3 integrated programs not yet listed by this name in ABET, but so-named in current university catalogs
+ demographics from College Factual [47] for smaller number of programs, typically with 6 or more graduates; n= 60, 4, 4 for engineering, general, and int/mult, respectively

The inter/multidisciplinary / integrated engineering degrees had generally high percentages of women among their graduates, ranging from 21% to 39% compared to 24% across all engineering Bachelor's degrees [9]. The median for General Engineering was quite low, even lower than the specialty fields of mechanical (17.3%) and electrical (15.5%). ASEE found that in 2016 smaller schools awarded a smaller percentage of Bachelor's degrees (overall) to females compared to all engineering schools [11]. The small size (and small number) of the general engineering programs might be a contributing factor; the data could vary a lot year-to-year. The median percentage of non-specialty 'engineering' Bachelor's degrees awarded to women (21.3%) was similar to engineering overall (which is predominated by specialty degrees).

With respect to the two largest URM groups, low percentages of 'general engineering' Bachelor's degrees were earned by Hispanic/Latinx and Black/African American students. The ranges of degrees awarded to URM students among 'engineering' programs were very wide, but the median of the programs was still lower than across all engineering programs. Similar to the gender results, the int*/multidisciplinary degree programs awarded the highest percentage of Bachelor's degrees to URM students compared to the other two non-specialty program names. It is important to note that the institution characteristics as a whole likely play a significant role (such as a Hispanic-serving institution or Historically Black College or University), in addition to the specific degree names.

Tracks and Specializations

Method: All of the ABET EAC-accredited non-specialty programs in the U.S. that had awarded 8 or more degrees in engineering, all of the general, interdisciplinary, multidisciplinary, and integrated engineering programs, and some additional (smaller) engineering programs were explored to determine the concentrations that available within the non-specialty engineering degree. In total 75 programs were characterized. This involved going to the relevant program websites and catalog listings. The terms most commonly used to describe these focus-areas were: concentration, emphasis, and specialization; rarely option or focus. In addition, across all 86 programs (regardless of number of graduates) it was noted whether the institutions also offered specialized engineering degrees (e.g., mechanical engineering).

Results: The non-specialty engineering degree programs take a diversity of approaches to focus areas. Some programs require that students select a focus area, while others are intentionally broad or multidisciplinary or allow students to select a specialization if they choose to do so. Some very small programs may not have the capacity to offer specializations. At some institutions engineering is supported from a single department that also includes physics, computing, and/or mathematics; there may simply not be the bandwidth among faculty to offer multiple specializations. Within liberal arts focused institutions engineering may already be considered a focus. A handful of the programs had also clearly grown to a B.S. degree from what was previously a "two plus" arrangement where students would earn an engineering B.S. degree from a partner university.

Where specializations within degrees were required, these were sometimes advertised on websites and treated in catalogs as separate degrees. When this approach was used it was difficult to readily determine the amount of 'specialized' coursework required, as compared to the commonality across the specializations. Other programs have a single engineering degree 'base' to which students are required to add a specialization. Those more singular engineering degrees sometimes have an option for a self-designed student specialization. The number of credits required in the specializations which branched from a common stem ranged from 7 to 41 credits, with a median of 18 credits.

The types of specializations available vary widely. Some institutions offer specialization tracks that mirror specialty degrees that are available at the institution. For example, at the University of Southern Indiana four of the emphasis areas in the engineering degree match available full majors with one additional emphasis in mechatronics; for example [49]:

> The curriculum for the BSE, mechanical engineering emphasis, closely tracks that of the BSME, with a few differences in required courses, and the added flexibility for you to take up to four technical electives outside the traditional mechanical engineering curriculum.

Other institutions do not offer engineering specialty degrees, and specializations within the engineering degree map to common engineering disciplines.

The number of different specializations available within each program ranged from 0 to 10 ('individualized' was counted as a specialization if it was listed among a menu of options for the required concentration to earn the degree). There were 12 programs that did not require a specialization (at 2 of those options were listed as available). A few of the programs that did not require a specialization noted that they had intentionally embedded both mechanical and electrical into the required courses in the engineering major. The most common specialization options among the 75 non-specialty degrees were in standard engineering disciplines: mechanical (n=44), electrical (n=44), computer / software (n=33), civil (n=24), industrial (n=9), chemical (n=8), aerospace (n=4), and materials (n=3). Degree specializations were also common in emerging 'intersectional' disciplines such as biomedical (n=19), environmental (n=14), and mechatronics / robotics (n=9). There were 11 programs that designated one of their concentrations as "general", to contrast that option with specializations (such as mechanical and electrical). There were 11 programs that explicitly listed an 'individualized' option for students, pending approval of a program advisor. There were also 17 programs that offered unique specialization options to students, including design (n=6), energy-related (n=5), entrepreneurship (n=3), sustainability (n=2), humanitarian (n=2), innovation (n=2), and others. Some programs also articulated non-technical specialization options for students in areas like management (n=5) and law. So there was truly a broad array of approaches to focus areas across the non-specialty engineering programs.

The small number of general and int*/multi programs preclude statistical comparisons versus engineering degrees; the characteristics of these different programs are summarized in Table 3. The majority of the general engineering programs (among n=5) did not offer or require concentrations. Standard engineering disciplines (i.e., mechanical, electrical, computer, civil, chemical, or industrial) were common concentrations in the 'engineering' programs, while these standard disciplines were not common options in the general engineering programs. Unique concentrations and an individualized option were most common within the int*/multi programs.

Table 3. Concentration Availability in Different Program Types

			% programs with concentration types		
Program Name	N programs	N concentrations Min-Med-Max	Standard Eng Disciplines	Unique	Individualized
Engineering	64	0 – 4 - 9	84	19	9
General Engineering	5	0 – 0 - 5	20	20	20
Int*/Multi Engineering	6	0 - 5.5 - 10	50	50	83

Discussion: There were a number of models found for non-specialty engineering degrees. The first appears to be at small institutions (often liberal arts focused, religiously-affiliated, or smaller public regional campuses) where a single engineering degree is offered. The most common name for this degree was simply 'engineering.' The majority of the non-specialty engineering degrees required students to select a focus area comprised of a cluster of courses for depth in a particular area. These specializations were most often in 'standard' or traditional engineering specialty areas (e.g., mechanical, electrical), some were in emerging/interdisciplinary areas (e.g., biomedical, mechatronics), some were in unique cross-cutting areas (e.g., energy, humanitarian), and a few were in non-engineering professions (e.g., business, law). A number of the non-specialty engineering degrees alternatively allowed students to individually design a focus area.

In the above benchmarking exercise, 51 institutions only offered the single non-specialty B.S. engineering degree. There were 35 institutions with ABET EAC accredited non-specialty engineering degrees that also offered one to ten disciplinary engineering degrees.

Total Curriculum Credits

Method: Online 2022/2023 institution catalogs were examined to characterize the minimum total number of credits required to earn the ABET EAC-accredited B.S. degree in engineering. Some of the programs listed in the ABET search were no longer found in catalogs or on institution websites; it appeared they had been replaced with separate disciplinary degrees. In a few cases, curricula were not clear or the institution seemed to count courses rather than credits; these programs were removed from the dataset. Credits were logged as standard semester credit hours; this required converting quarters to semesters in a few cases. Ultimately, 77 programs were included in the dataset to characterize the total number of credits in ABET EAC accredited non-specialty engineering degrees. Among this group there were 35 institutions that also offered one or more ABET EAC accredited engineering degrees in specialty areas; these were used for paired comparisons.

Results: The total credits required to earn ABET EAC-accredited non-specialty engineering degrees ranged from 120 credits to 147 credits, with a median of 128 and a mean of 127.6; results are summarized in Table 4. The total credits in these non-specialty degrees is similar to the median of 128 credit hours required in the 103 degree programs in mechanical, electrical, chemical, and civil engineering that was previously reported [43]. Overall the average number of credits was the lowest among engineering programs, followed by general engineering, and highest among interdisciplinary / integrated / multidisciplinary; these differences were not statistically significant. A lower number of credits, on average, was required in non-specialty degrees compared to specialty engineering degrees at the same institutions. The total credits were identical at 16 institutions, lower in non-specialty degrees at 14 institutions, and higher in the non-specialty degrees at 5 institutions. Within the engineering degrees specifically, there was not a statistically significant difference between the total credits in the non-specialty and specialty degrees. (For the general and int*/multi degree groups the number of comparators, taking into account ties, were too small for statistical analysis.)

Table 4. Total Standard Semester Credits to Earn B.S. Degrees among ABET EAC-accredited programs

Non-specialty degree name	Non-specialty degrees		Non-specialty at institutions with specialty degrees		Comparator specialty degrees ^	
	n	Average[v]	n	Average	n	Average
All non-specialty	*77*	*127.6*	*35*	*127.8*	*35*	*129.2* [D]
Engineering	65	126.9	25	126.2	25	126.8
General Engineering	6	130.2[n]	4	130.5	4	135.8
Interdisciplinary, integrated, multidisciplinary	6	132.5[n]	6	132.5	6	134.7

[v] At some institutions, variable total credits among different concentrations or specializations within the degree; recorded a single value per institution representing the most 'general' version

^ Varied at some institutions among different specialty degrees; if so, reported mechanical if available; if no mechanical, electrical

[n] Tested for statistically significant difference versus 'engineering' degrees with Mann Whitney U test; not significantly different with $p > 0.10$.

[D] Tested for statistical significant different versus "non-specialty' degrees with Wilcoxon Signed Rank test; p .038

Discussion: The total credits required to earn degrees can be interpreted in a variety of ways. Some have a ‘more is better’ perspective, believing that more credits provide a richer education for students. This might be particularly relevant for engineering students where both a breadth and depth of technical content is important, in addition to breadth in non-technical areas and professional skills (working toward a T-shaped engineer). Others may believe it is possible in these non-specialty degrees to aim for less depth, and therefore fewer total credits are needed. Non-specialty degrees are not required to meet program specific criteria in ABET. A degree with fewer credits may be more affordable and accessible to students. For institutions offering both specialty and non-specialty degrees, the lower credits in non-specialty degrees may increase their attractiveness to students or they might be perceived as less rigorous. It is also important to note that in some cases state or institutional limits constrain the total credits. To assist in affordability and reasonable time-to-degree some states now limit the total number of credits in all Bachelor’s degrees to 120 credits. Within the current dataset there were 14 non-specialty engineering degrees at 120 credits (5 at public institutions, 9 at private).

Balance of Technical and Non-technical Coursework

Background: ABET EAC accreditation Criterion 5 requires a minimum of 30 semester credit hours of math and natural sciences and 45 semester credit hours of engineering topics [42]. For an engineering degree requiring 120 credit hours this means that a minimum of 62.5% of the curriculum must be comprised of technical coursework. However, for curricula that require more than 120 credit hours this could be a lower percentage; a 128 credit program could include a minimum of 58.6% technical coursework.

The curriculum requirements for engineering programs at 46 ‘top ranked’ institutions were previously compiled based on the 2013-2014 catalogs [50]. The dataset included 10 institutions that offered ABET EAC-accredited disciplinary engineering degrees (ranging from 2 to 11 per institution) in addition to a BS degree in either “general engineering” (n=5) or “engineering” (n=5). Among those 10 EngGE degrees only 4 were ABET EAC-accredited. At the time the ABET EAC requirements for Criterion 5 were worded in terms of years (rather than credits) and thus interpreted to require a minimum of 62.5% technical coursework regardless of the total number of credits in 4-year Bachelor’s degrees [51]. Paired statistical comparisons were conducted comparing the percentage of technical courses in the ‘general’ engineering degree at the institution to the median of the disciplinary engineering degrees offered at each institution. As shown in Table 5, the EngGE degrees required a lower percentage of technical courses than the disciplinary engineering degrees.

Table 5. Percentage of technical courses in engineering curricula from 2013-2014 catalogs [50]

Degree Type	N institutions	Median total credits^	Min % Technical courses Min – Med – Max
Engineering / general BS 5A	10	130	47 - 72 - 80
Engineering specialty A	10+	130	64 - 76 - 80*
Engineering BS (sole) A	2	32, 128	63, 66
General Engineering BA	1	120	58
Engineering Science BS A	2	134	81

^ credits were counted differently at institutions inclusive of quarters, semesters, units

A ABET EAC accredited; + 59 BS degrees across all 10 institutions (e.g., mechanical, electrical, civil)

* Wilcoxon signed rank 2-tailed $p = 0.04$ when comparing disciplinary to non-specialty degrees

Among the old data set there were also two institutions that offered ABET EAC accredited EngGE degrees with no specialty degrees available (noted “sole” in Table 5). In both programs the percentage of required technical coursework was near the minimum allowed by ABET, and below the median found at the 10 institutions that included both specialty and a non-specialty engineering degree. Additional programs in Engineering Science (both highly technical and ABET-accredited) and one BA degree that would not have met ABET requirements were also available in the dataset because their institutions were ‘top ranked’ for engineering.

Method: Benchmarking was updated using 2022/2023 online catalogs. The goal was to intentionally include the programs previously explored, as well as additional programs with an array of names including a few not ABET EAC-accredited. A first note is that three of the ‘General Engineering’ degree programs benchmarked in 2013 had since been renamed – to Engineering, Interdisciplinary Engineering, and Systems Engineering and Design. It seems that ‘general engineering’ is becoming less popular, being replaced with either just ‘Engineering’ or another name. Thus, the new benchmarking included the previous institutions, where relevant, but also was expanded to additional programs.

The online catalogs of institutions were examined to characterize the amount of required technical coursework. Courses in engineering, computing, mathematics, and natural science were grouped into technical. This includes specific courses (like calculus 1, thermodynamics, capstone design) and technical electives. Non-technical courses included humanities, arts, social science, writing / communication, and business courses. For this analysis, free electives or specializations that allowed students to select technical or non-technical courses were counted as non-technical, and thus represent the largest percentage of the degree that could be non-technical. Ultimately, 34 non-specialty degree programs were benchmarked, which awarded 1 to 192 Bachelor’s degrees each in 2022 (median 13 graduates).

Results: The data from the current benchmarking exercise are summarized in Table 6 and Figure 1. Among the ABET EAC-accredited programs, the combination of 19 Engineering and General Engineering degree programs required lower amounts of technical content (median 73%) compared to the 7 degrees that included the words Integrat(ed/ive), Interdisciplinary, or Multidisciplinary in their name (median 79%; non-parametric Mann Whitney U test 2-tailed $p = 0.0244$).

Table 6. Range of Minimum Percentage of Technical Coursework in Different Degree Programs

	Institutions in Dataset		Percentage Technical		
Degree Type	n public	n private	Minimum	Median	Maximum
Engineering ABET	8	6	63.3	73.4	80.6
General Engineering ABET	2	3	68.5	71.3	73.9
Integrated Engineering ABET^	2	2	63.3	79.8	83.3
Inter/Multidisc Engrg ABET	3	0	78.5	78.9	79.2
All EngGE ABET (sum of above)	*15*	*11*	*63.3*	*73.9*	*83.3*
Non ABET EngGE	6	2	62.5	72.3	83.2

^ These degrees include integrated or integrative; some of these degree names not shown yet in ABET degree search, but marketed on website; also include 1 ‘on track’ for ABET, but accreditation not completed yet

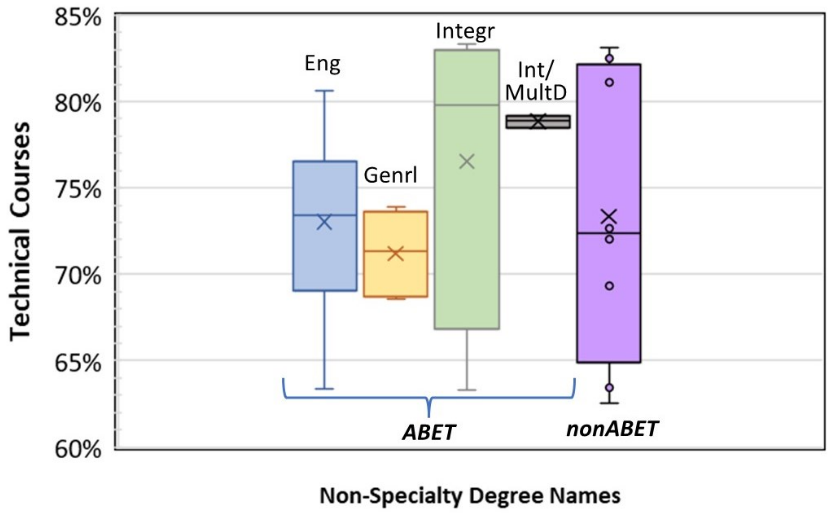

Figure 1. Comparison of technical courses in non-specialty engineering degrees

The technical content among 8 non-ABET accredited non-specialty engineering degree were highly variable. There were not statistically significant differences between the ABET EAC accredited and non-ABET EAC accredited programs in the minimum percentage of the curriculum that was required to be technical courses.

While exploring the program websites and catalogs of the ABET EAC-accredited programs, mention of the NCEES Fundamentals of Engineering (FE) Exam was logged. The engineering program at Western Illinois University indicated in one location that students were "required to pass the FE exam" [52]; but in the current online catalog this requirement was not evident [53]. Rather, there was a statement that for engineering transfer students "Final advanced placement credit will be granted upon proof of passing the Fundamentals of Engineering Exam." Four institutions required students pursuing the non-specialty engineering degree to take the FE exam prior to graduation. A number of other programs indicated seniors "should take the FE exam", that their students were "highly encouraged" to take the FE exam, and/or that their program "prepared students to pass" the FE exam. In only a handful of programs / institutions was there no mention of the FE exam found on their website or in their catalog.

Discussion: The analysis of curriculum requirements in non-specialty programs found a wide-range in the percentage of the credits allocated to technical courses. All of the programs, including 8 not accredited by ABET exceeded the minimum ABET requirement for math, science, computing, and engineering content of 62.5%. Some appeared very highly technical, the highest requiring 83.3% technical courses. The 20.8% range represents about 26 credits in a 128 credit program (the average found in Table 4). This course-based analysis is very simplistic, failing to account for non-technical content that is integrated within engineering courses. The University of San Diego in the Integrated Engineering degree requires that all students take GENG 350 *Engineering and Social Justice* (3 cr) [54], GENG 250 *Integrated Approach to Energy* [25], and GENG 380 *Sustainability and Engineering* [55]. Given the GENG program designation these courses were counted as technical, but clearly they strongly integrate socio-technical considerations. This truly combined and contextualized approach seems clearly aligned with the philosophy of integration.

In regards to the FE exam, requiring students to take the exam helps to ensure that students are on-track for engineering careers and eventual professional licensure, should they choose that path. Licensure is common and almost a requisite for advancement in some disciplines like civil engineering. Requiring the FE exam might also be viewed as a means to indicate the technical rigor of the program. Some institutions published and touted the FE exam pass rates of the graduates from their non-specialty degree programs (e.g., 95%). Thus, messaging around the FE exam might be used to counter perceptions of lower rigor or technical preparation among students graduating with non-specialty engineering degrees.

Choice in Coursework

Background: The amount of choice that students have when selecting courses can vary widely. For example, a student may have the option to select among three versions of a statistics course or multiple versions of a thermodynamics course. These course options may differ in focus (e.g., a general math statistics course versus a statistics offered in mechanical engineering) or teaching style (a lecture-based thermodynamics course versus a course that also includes a laboratory). In some cases students may be offered greater choices to select from a menu with different courses (e.g., select a course that satisfies a history requirement) or have a much more open choice such as a technical elective. Free electives give students complete autonomy to select any college course of interest, and may be an engineering or non-engineering topic.

Data from the EngGE degrees that were benchmarked in 2013 (previously discussed above in association with Table 5) are shown in Table 7. Total choice represents any point in the curriculum where students were not required to complete a single specific course, and is reported as a percentage among the total credits required for the degree. The level of total choice and free electives were higher in the EngGE degrees in comparison to the discipline-specific engineering degrees at the same institutions. The Bachelor's of Arts degree in General Engineering included the high of 90% choice. But some of these were small choices, such as selecting among multiple versions of calculus. In a previous study the median level of choice in comparator STEM programs was 60% in chemistry, 63% in physics, and 76% in mathematics [46].

Table 7. Course choices in engineering curriculum based on 2013-2014 catalogs [50]

Degree Name / Type	N institutions	% total choice Min -Med - Max	% free electives Min - Med - Max
Engineering / general BS [5A] Engineering discipline [A]	10 10^{+}	32 - 56 - 86 17 - 34 - 66^{*}	0 - 2 - 32 0 - 1 - 12^{**}
Engineering BS (sole) [A]	2	38 - NA - 59	5 - NA - 6
General Engineering BA	1	90	14
Engineering Science BS [A]	2	34 - NA - 49	4 - NA - 7

[A] ABET EAC accredited; $^{+}$ 59 BS degrees across all 10 institutions; NA = not applicable
Disciplinary vs. non-specialized degrees using a Wilcoxon signed rank 2-tailed * $p < .05$, ** $p < .01$

Method: The current catalogs were used to characterize total choice among EngGE programs in 2022-2023. The same programs benchmarked for the percentage of technical courses in the curriculum were studied. Any location in the curriculum where a single specific course was required was noted, and the difference against total credits represented choices that students could make. Free electives were not specifically counted due to the challenge of deciphering this in some catalogs. For example, while the total credits were clear it was unclear if some of the ‘common curriculum’ / general requirements at an institution were covered by ‘double counting’ courses listed in the non-specialty engineering curriculum thereby resulting in ‘free elective’ credits. Within some non-specialty degrees the level of choice varied among different concentration options; the most flexible version of the curriculum was quantified, which in some cases was the individually-designed option. It addition, courses within concentrations or specializations that were embedded as part of the EngGE degrees were counted as choice.

Results: Table 8 and Figure 2 summarize the total percentage choice in the non-specialty engineering programs. There was a wide range in the amount of choice between different program types, ranging from a low of 22% to a high of 92%. Similar to the percentage of technical content, among ABET EAC-accredited programs it was found that the 19 engineering and general engineering degrees offered less choice (median 34.4%) compared to the 7 integrated / interdisciplinary / multidisciplinary degrees (median 66.7%; Mann Whitney U test, 2-tailed, p = 0.00782). There was not a statistically significant difference between ABET EAC-accredited and non-accredited programs (Mann Whitney U test, two-tailed p = 0.15).

Table 8. Range of Total Percentage of Choice in the Courses in Different Degree Programs

Non-specialty Engineering Degree Names / Types	n	Minimum	Median	Maximum
Engineering ABET	14	22	40	75
General Engineering ABET	5	23	28	35
Integrated Engineering ABET^	4	41	58	92
Interdisciplinary / Multidiscipl Engineering ABET	3	51	71	82
All EngGE ABET (sum of above)	*26*	*22*	*42*	*92*
Non ABET EngGE	8	34	56	82

^ These degrees include integrated or integrative; some of these degree names not approved in ABET, but marketed on website; also, 1 ‘on track’ for ABET, but accreditation not completed yet

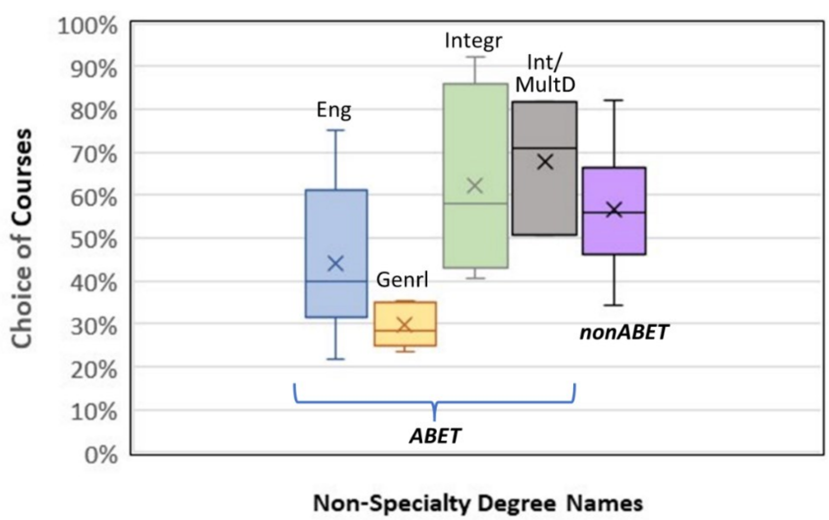

Figure 2. Total percentage of choice in selection of courses in non-specialty engineering degrees

Discussion: The level of choice in non-specialty engineering degrees is somewhat difficult to characterize. For example, once a student opts for a particular concentration this frequently locks in 3 to 7 courses. This could be considered similar to a student's choice of a specialty major, particularly at the institutions were separate engineering degrees in disciplinary specializations were not available. In a number of programs one of the options was a general track which then offered a large menu of course options or a self-designed concentration. Further, in this study the choice among multiple versions of the same course (e.g., calculus 1) has been counted the same as a free elective choice. Thus, the degree of 'actual' choice might vary a lot at the same total percentage characterized in this study.

The highest level of choice among all of the programs was 92%. This level of choice was possible because nearly every core topic had multiple options available from different departments. For example, there were both Math and Applied Math versions for all of the calculus requirements; there were multiple versions of chemistry, statics, dynamics, fluid mechanics, thermodynamics, etc. courses available. Almost the sole group of required courses for all students was a thread of three integrated design engineering courses. This is a benefit of a program available at a very large institution, although it certainly complicates outcomes assessment for ABET. If 'course topics' (e.g., Calculus 1) are counted as singular requirements, choice in that program drops to 56%. The program does include between 13 to 17 credits of free electives (10-13% of the curriculum, depending on which concentration is selected). So there is quite a lot of student autonomy in the program. This level of autonomy allows students to select courses and course versions that best match their interests and learning preferences.

Comparisons to the level of choice in specialty engineering degrees offered at the institutions cannot be made based on the current dataset. This is an area for future work.

ChatGPT Findings

Method: An interesting exercise was conducted, asking the AI system ChatGPT to define the terms 'integrated engineering', 'interdisciplinary engineering', and 'general engineering'. GPT-3 was trained on an Azure AI supercomputing infrastructure including 570 gigabytes of text with 175 billion parameters, and the ChatGPT research release seems similar [56].

Results and Discussion: The results of the ChatGPT query are shown in Figure 3. Highlight color has been added to draw attention to similar and different terms in the answers received. Areas of similarity across Integrated, Interdisciplinary, and General include the ideas of multiple disciplines / multidisciplinary, design, and manufacturing. Only the General Engineering description included the term *practical*, with respect to knowledge, solutions, and application. The Integrated and Interdisciplinary descriptions include an emphasis on complex problems / systems / projects, which demand creativity, innovation, or novel approaches. Integrated Engineering includes a unique discussion of social, economic, environmental, and sustainability issues, which are not discussed in the descriptions of Interdisciplinary or General. This finding associated with Integrated Engineering aligns with a recent report from the National Academies "The Integration of the Humanities and Arts with Sciences, Engineering, and Medicine in Higher Education: Branches from the Same Tree." Interestingly, the curriculum analysis of Integrated programs (Table 6) did not find more non-technical courses, but as previously discussed the engineering courses perhaps integrate social, economic, environmental, and sustainability issues.

What is integrated engineering?	What is interdisciplinary engineering?	What is general engineering?
Integrated engineering is a holistic approach to engineering that combines multiple disciplines, such as mechanical, electrical, and computer engineering, to design and develop complex systems. This approach recognizes that many engineering problems and projects involve multiple interconnected systems and require a **broad** range of expertise to solve. Integrated engineering also emphasizes the importance of considering the social, economic, and environmental impacts of engineering projects and designing solutions that are sustainable and meet the needs of all stakeholders. This approach encourages engineers to think critically and creatively about the big picture and to consider the long-term consequences of their work. Examples of projects that might be approached using an integrated engineering approach include the design of advanced manufacturing systems, renewable energy systems, and complex infrastructure projects.	Interdisciplinary engineering is a approach to engineering that involves the integration of knowledge and techniques from multiple disciplines to solve complex engineering problems. This approach recognizes that many engineering problems cannot be fully understood or solved using a single discipline, and requires a **broad** range of expertise to be effectively addressed. Interdisciplinary engineering often involves the collaboration of engineers from different specialties, as well as scientists and researchers from other fields, to develop innovative solutions to challenging problems. This approach encourages the sharing of knowledge and ideas across traditional boundaries and can lead to the development of novel technologies and approaches to engineering problems. Examples of interdisciplinary engineering projects might include the development of new materials or technologies for renewable energy systems, the design of advanced medical devices, or the creation of novel manufacturing processes.	General engineering is a **broad** field that encompasses a wide range of engineering disciplines and applications. It is a broad-based, multidisciplinary field that involves the application of scientific, mathematical, and practical knowledge to design, build, and maintain a wide variety of systems and structures. General engineering typically involves the application of engineering principles to solve complex problems and create practical solutions for real-world challenges. Engineers in this field may work on projects ranging from the design and construction of infrastructure projects, such as roads and bridges, to the development of advanced manufacturing systems and technologies. General engineering is often focused on the practical application of engineering principles, rather than the theoretical or academic aspects of engineering. Engineers in this field may work in a variety of settings, including research and development, manufacturing, construction, and consulting, and may be involved in all stages of the design and development process, from conception to implementation.

Figure 3. ChatGPT AI-based answers to queries to define terms (Dec. 30, 2022)

Text Descriptions and Corpus Analysis

Method: The text used on program websites to describe their degrees were scraped and analyzed for word content using corpus analysis. First, the corpora were created by scraping the text from websites describing programs. Degrees were combined by name types, regardless of ABET accreditation status. In order to increase the number of integrated engineering degrees, 2 institutions from Canada and 2 from the UK were included in the dataset. Corpus analysis followed the recommendations from Yassine Iabdounane [57] and used the software AntConc for the text analysis [58]. However, all of the corpora developed for each degree type are much smaller (in terms of the total word counts) than is typically used on corpus analysis.

Results: Table 9 shows the results from the initial trial, with the degree name with a higher representation of the term shown in bold and red indicating a lower occurrence. Table 10 pulls out more clearly the unique terms, as a summary of the information in Table 9. The trends visible here are different than previous analyses. For example, ChatGPT included 'practical' problems in the description of general engineering but not integrated or interdisciplinary; however, the website analysis found that integrated engineering programs used the term practical to a larger extent than the other non-specialty engineering degree names. Given the small number of programs in each name group and small number of words total, the results are unable to reveal clear differences.

Table 9. Summary of results of corpra analysis (sorted from largest difference to least)

Program Name:	**Engineering**	**General**	**Integrated**	**Interdisciplinary**
Institutions in data set	11	11	9	6
# words (tokens)	17,462	12,645	18.273	7807
# terms (types)	2551	1742	2468	1375
Normalized frequency per 10,000 words				
General	20	**165**	3	18
Interdisciplinary	9	10	10	**152**
Elective*	22	58	11	**72**
Integrat*	10	2	**54**	0
System*	**73**	20	44	40
Project*	34	26	**71**	24
Concentration* + emphasis + speciali*	65	47	37	**79**
Science	49	66	23	51
Design*	90	65	88	82
Profession*	34	24	**42**	29
Broad/breadth	20	18	15	5
Practical	1	3	14	0
Leader*	13	11	7	**20**
Global*	19	17	7	18
Multidisciplinary	5	2	8	**13**
Complex* + novel	14	7	10	6
Collaborat*	14	7	12	8
Individual* + custom* + flexib* + choice*	23	22	18	23
Creativ* + innovate*	21	15	25	18
Social	17	11	11	13

Table 10. Terms over and under represented in the corpora of different non-specialty degree types relative to each other

Degree Name	Over-represented	Under-represented
Engineering	System	
General	General, science	Design, System
Integrated	Integrat*, project*, profession*	General, Elective*, Global*
Inter / multi-disciplinary	Interdisciplinary, (Conc/emphasis/speciali*), leader*, elective*	Broad / breadth

Limitations and Future Work: After further consideration, some important differences were found in the type of content included in the web scraping: some programs included all of the courses / curriculum and others did not; some included the ABET 1 to 7 outcomes and others did not. In addition, language (word choice) in Canada and the UK (4 of the programs in the integrated dataset) might differ significantly from American English. This could have a large impact on the frequency weightings. In the future, the analysis could be conducted with a larger set of data and more explicit inclusion and exclusion criteria for website content. In addition, it might be more revealing to compare specialty degrees (e.g., mechanical) against the non-specialty degrees. More sophisticated analysis of concordances and other language analysis might yield useful insights with these larger datasets.

More broadly, the employment and/or graduate school pathways of graduates from these non-disciplinary engineering degrees are of interest. This includes both quantitative information, as compared to disciplinary engineering degrees, as well as qualitative information on the student experiences during their job search and early career (including satisfaction and feeling prepared). Trends in the creation and naming of non-specialty engineering degree programs could be tracked in the future.

Summary

In general there were not significant differences found among non-specialty engineering degree programs titled engineering, general engineering, integrated engineering, or interdisciplinary/ multidisciplinary based on the majority of the characterization methods used. Among non-specialty degrees the name ‘engineering’ was the most popular, with a small number of general, integrated, or inter/multidisciplinary upon which to make comparisons. The range of program characteristics within a single name types varied a lot among programs. Local institutional factors perhaps determine the name selected for different programs, although the name ‘general engineering’ appears to be decreasing in popularity. Within a single program name type, multiple approaches are evident: serving as the only engineering degree offered at the institution, offered alongside specialty degrees and offering concentrations in those specializations, offered alongside specialty degrees and offering different concentrations that may cross traditional disciplinary boundaries, offered to provide students a flexible or more individualized engineering degree. Many of the non-specialty engineering programs awarded a very small number of Bachelor’s degrees in the most recent academic year. These non-specialty engineering degrees most commonly require a similar number of total credits as disciplinary engineering degrees offered at the same institution (on average 1.4 fewer credits). Non-specialty programs differ widely in the extent to which they require technical courses – ranging from 62.5% to 83.3% of the total credits, with engineering and general engineering programs overall requiring a lower percentage (73% median) than integrated, interdisciplinary, and multidisciplinary (79% median). The AI-based ChatGPT provided interesting similarities and differences in its definitions for general engineering, integrated engineering, and general engineering. This was perhaps the most informative in helping programs to select among these three names (although marketing considerations might lead a program to name its degree ‘engineering’ rather than ‘general engineering’). Overall, the findings provide interesting insights for institutions considering creating new non-specialty engineering degrees or renaming or revising an existing non-specialty engineering degree program.

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