ALLAN HANCOCK COLLEGE

PROGRAM REVIEW

2020-2021

Program Name: **Engineering**

Self-Study Members: Dominic Dal Bello

PROGRAM REVIEW - ENGINEERING

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Status Summary - Plan of Action-Post Validation

During the academic year, 2005-2006, the Engineering Program completed program review. The self- study and validation teams developed a final plan of action-post validation based on information in the self-study and the recommendations of the validation team. Modifications were made via annual updates.

For each plan, indicate the action taken, the result of that action, and the current status of the plan, if it is incomplete. (If any plan was made and action not taken, please state the rationale for not pursuing that particular item.)

PLAN OF ACTION	ACTION TAKEN, RESULT AND STATUS Current Status/Latest Update in bold.
1. Formally establish learning outcomes and assessment measures	SLOs for all courses & program established. **F16**: 55% of Course SLOs have been assessed. More need to be assessed. **F20: The college has moved to a new assessment pattern which is now being employed. Program Outcomes will be assessed by work done in individual courses.**
2. Create/distribute engineering program brochure and packet for students, prospective students, parents. etc.	Brochure done (F2007). Packet not done. **F20: Brochure still needs revision.** **F20: AHC Engr. faculty plan to author academic/help packet for Engineering/STEM students.**
3. Develop more formal larger-view academic program for engineering students to follow (e.g., create general tracks for Mechanical/Civil/Aerospace and Electrical/Computer Engineering)	A study of all engineering programs in the state (F2010) was conducted by AHC Engr. Faculty. AHC Engr faculty has looked at different CCC programs and has been involved in IMPACT, LDRP, SB1440/C-ID discussions about transfer process (2003-present). An Engineering transfer degree (AS-T) would require 70-80 units before transfer, and thus is well above the 60-unit limit (Engr would require more than a Physics AS-T, which is already stretching the 60-unit limit). State-wide engineering focus has been on C-ID descriptors. The AHC Engineering Faculty was the primary author of the Strength of Materials C-ID descriptor (ENGR 240). **F15**: Four Engineering Intersegmental Model Curricula (ISMC) have been approved at state-level. These are not AS-T degrees. Recently (circa 2017), a Transfer Certificate has been authorized thought the C-ID process. **F20: As part of Guided Pathways process, the MESA Counselor, with the Engr faculty, part-time STEM counselor, and Articulation Officer, developed four AHC Engineering pathways over spring/summer 2020: Mechanical, Electrical, Civil and Computer. Seven more have recently been created.**
4. Implement formal	Presentation to Counseling Department on Engineering and

advising/mentorship procedures; require SEP for all engineering students; work with Counseling Department to communicate changes in requirements of engineering students (e.g., CSU LDRP-Lower Division Transfer Pattern, and UC discussed ETC-Engineering Transfer Curriculum)	Science transfer issues in F09, S11, F11, F12, F13). An SEP project in ENGR 100 requires students to get an SEP. CSU LDRP is defunct; "replaced" by SB1440, C-ID. NSF S-STEM grants (SESMC/ESTEEM/ENGAGE) have components that encourage all STEM students to get SEPs. State regulations and Guide Pathways also will encourage/require SEPs. **F20: Visit Counseling Dept to update changes in transfer and AHC engineering curriculum/pathways.**
5. Coordinate with math, science, computer science, engineering technology (drafting), and English department (technical writing) to more effectively offer classes	Ongoing – As needed, Engineering meets with Chair of Math. Sciences (himself) and Chair of Life & Physical Science to attempt to coordinate STEM courses. There is more demand for STEM courses, and limited staff and limited classrooms and labs requires coordination. AHC ENGL 104 Technical Writing is offered in the summer (it is a graduation requirement in College of Engineering). Its articulation with Cal Poly was almost removed as Cal Poly's course became a CSU G.E. which community colleges cannot match. AHC MESA Coordinator and AHC Engr. Faculty negotiated a new articulation agreement (AHC ENGL 104 and a G.E. A-3 course) to allow ENGL 104 to transfer and count for CP's College of Engineering graduation requirement. **F20: There seem to be more schedule conflicts within STEM than in the past. As Guided Pathways are implemented, scheduling needs to be revisited overall as well as the interactions of the schedule with other STEM courses.**
6. Continue to participate in outreach activities	Ongoing – time permitting Engineering faculty and students have participated at every Friday Night Science and STEM Week of Discovery and Open House event, most AHC Career Exploration Days, and numerous other outreach activities. The faculty and students even participated in Cal Poly's Engineering Night (S14), which was based in part on AHC Friday Night Science. **F20: Ongoing.**
7. Continue to support MESA and Society of Women Engineering Interest Group	Ongoing – The engineering faculty serves as the instructional Faculty Advisor for the MESA Program. **F20: Continue to support MESA and encourage underrepresented groups in engineering.**
8. Support creation of general engineering club to encourage professional growth	Fall 14 saw creation of Science and Engineering Club, in which the Engineering Faculty served as Co-Advisor. The primary goal of the club is to encourage professional development activities and professional connections (as recommended by the AHC Engineering staff). **F15-F20: Engr. Faculty acts as informal advisor to Club, and encourages all students to attend club activities and**

	STEM guest-speaker and networking opportunities.
9. Modify Engr 172/173 to better articulate with Cal Poly and UCSB	Completed S2006, and articulates. AHC is about the only CCC that offers this courses as Cal Poly and UCSB are fortunately the "only" UC/CSU to offer such at the sophomore level. S15: Course has not been offered in several years due to lack of enrollment (it only makes sense for Electrical and Computer Engineering majors). Engr 172/173 will be deactivated. S17: UCSB Electrical Engr redesigned its curriculum and no longer articulates courses with community colleges. **F20: Engr. 172/173 was deactivated.**
10. Modify or create new courses as necessary to improve articulation	On-going- The one-unit Engr126 (MATLAB) currently articulates directly to UCSB's Engr 3. **F20: A 2- or 3-unit course in MATLAB will eventually need to be created as more engineering departments at universities switch to MATLAB as the "programming language" for Engineers. There is an engineering MATLAB C-ID descriptor.**
11. Rewrite A.A. requirements to reflect changes in Computer Science and other disciplines	Completed S2010. **F20: Ongoing.**
12. Communicate with Cal Poly and UCSB on a regular basis to ensure articulation or courses and ease transitions for students	Ongoing-Frequency of contact with CP and UCSB can vary between weekly to monthly. **F20: Due to Engr faculty's grant activities, there are weekly meetings with various faculty at Cal Poly over the last few years.**
13. Develop contacts with local industry: guest speakers, internships, mentorships, and financial and equipment donations	There is a good roster of local engineering guest speakers. No formal agreements have been made, but local industry often contacts AHC faculty for interns, etc. **F20: Ongoing.**
14. Create Engineering Advisory Council	No need S2006 – As need, receive advice from CCC Engr Faculty, UC/CSU faculty and administrators. **F15. n/a**
15. Create engineering program fund through AHC Foundation for Equipment and Scholarships	Completed S2008. Account used as pass-through to host Engineering Liaison Council conference in Spring 14. **F20 Efforts need to be reenergized to grow this account and determine how to effectively use funds. Local companies and alumni should be contacted. Need to work with other groups on campus to ensure not "double-asking" companies.**
16. Move office to new science building to be near lab	Completed F2008 (from building K to M). **F15: In M-309A since Fall 2011 (Dept. Chair for Math Sciences)**
17. New classroom/lab (room ~~208~~ **M-212**, new building)	Room M-212 is used for labs and classes. Engr. has primary control of room. Also used for Physics, Agri-Business, and

	Math. More math classes are being scheduled in M-212. **F20: Math classes should not be scheduled in M-212. It is a lab space.**
18. Obtain equipment to support program objectives: • Tablet Laptop Computer for Instruction/Outreach, • LaserJet Printer for Engineering Lab, • Tensile Testing Machine, • Rotation Beam Balance, • Injection Molding Apparatus, • Sand-casting Equipment, • Heat-treatment Furnace 3D printers?	Six of seven items acquired. • Tablet Computer: 21 Tablets acquired via HP Grant written by Engineering Instructor, F2008. • Laser Printer/Engr Lab: Acquired as part of new science building, F2007. • Tensile Testing Machine: Equip. Prioritization, F2009. • Rotating Beam Fatigue Machine, new science building, S2008. • Injection Molding Apparatus: spring instructional funds, S2006. • Sand-casting Equipment: program funds, F08, F09, F13. • Heat-treatment Furnace (dropped 2011; see note below). **Fall 2015: Tablets are out of date.** **Note: Tensile Tester needed to be fixed in Fall 2012 (broke during testing in S2012 approximate cost, parts and labor ~$2800 in 2012). There is no budget for repairs of this sort.**
19. Locate impact tester (stored on campus???) and find location to set up.	Impact tester could not be moved to M-212 due to structural requirements of floor. This is a machine used in one experiment in ENGR 162. It could potentially be used in Machine Technology/Welding. It is somewhere on campus and needs to be located and installed somewhere. **F15, F16, F20: Unknown location. Nowhere to install.**
20. Generate part-time Engineering Instructor pool Sabbatical fills?	Part-time instructor (an AHC alumnus) was hired in Fall 2011, the first PT instructor to help the current Engineering faculty. Preferred part-timers are alumni with (or near) masters degrees. They know the program, and are close to their time in school so academic material is filled. However, long-term part-timers for day-time classes have not been found. **F20**: **Most recent PT instructor was hired as FT faculty in Machine Technology.**
20a. Seek opportunities to hire lab technician/support staff for engineering, electronics, and physics.	$25,000-$30,000. Lab techs for Chemistry and Physics have been helpful in particular experiments, but are unable to support engineering program in general. Retirement of Electronics instructors leaves Electronics labs without technical support other than Engr Instructor and Part-time Electronics faculty. April 2013: Paperwork submitted for Engineering lab tech. May 2014: Paperwork submitted for Engineering lab tech. **F13-20: Positions (FT and PT) on the staff prioritization list, but no hires to date.**
21. Heat treatment furnace (listed as equipment to purchase in program	Dropped-S2011.

review but has not been funded)	Re-added, S2013: After discussions with Engineering instructors at various colleges, a heat-treatment furnace is needed. **F18: Purchased via equipment prioritization. An experiment needs to be written.**
22. Replacement work stations (DC Power Supply, desktop DMM, Function Generator, Oscilloscopes, test leads, etc.). for circuit labs. Possibly 10 stations) **Clarified S2011.**	$5,000 each = $50,000 Pre-F19: Current systems aging, and only 8 complete sets work in M-433. In F17/S18 new desktop set-ups of electronic equipment ordered using HSI-STEM funds and equipment prioritization funds. 10 set-ups in M-433, 2 in MESA/STEM Centers for student open access use, 1 in M-212 for demonstrations. **S19: New systems used for first time.**
23. Replacement Rockwell Hardness Tester**.** **Added: S2011**	April 2012: Purchased by HSI-STEM grant (~$2000) April 2013: Arrived in Fall 2012, installed by D. Dal Bello. **F20: Two testers in service, older one needs calibration. AHC Engr faculty maintain the machines. Professional calibration could be done one every 6 years.**
24. Rockwell Test Blocks **Added: S2011**	April 2012: Purchased by HSI-STEM grant (~$75 each…. ~$600). Arrived Fall 2012. F16. More purchased from instructional supplies, etc. **F20: More test blocks will be needed in the future.**
25. Do 6-year program view **Added: S2015.**	Current Document **F20: First draft submitted to Dean for review.**
26. Obtain 3D Printer + Supplies **Added: S2015**.	F15: Requested via AHC Equipment Prioritization and via HSI-STEM Grant. **F16: Received via HSI-STEM.**

2020-2021 Comprehensive Self-Study

I. Program Mission *(must align with college mission statement)*

For all programs, describe the need that is met by the program or the purpose of the program , and explain how it aligns with the college mission and strategic plan.

The educational mission of the **AHC Engineering Program** is as follows:

1. To prepare students to transfer to, and succeed at, a four-year undergraduate engineering program.
2. To provide courses that enable students to complete lower division engineering requirements for transfer to a four-year university, and/or to complete an Associate Degree in Engineering.

The program seeks to produce transfer-ready students who are technically competent in sophomore-level engineering subjects, who can communicate and work effectively in diverse teams, and who are responsible citizens. The program also seeks to promote student interaction with faculty, industry, student organizations and professional societies.

The Engineering Program at AHC produces graduates/transfer students who:

1. will succeed academically in, and graduate from, a four-year engineering program;
2. can apply the fundamental principles of mathematics, science, and engineering to solve basic engineering and scientific problems;
3. can work effectively as individuals and in diverse teams;
4. are effective communicators;
5. conduct themselves ethically and professionally, and exhibit personal integrity and responsibility in their actions;
6. continue to engage in life-long learning, including professional, academic and personal development.

The program directly supports the AHC mission of providing "quality educational opportunities that enhance student learning and the creative, intellectual, cultural, and economic vitality of our diverse community."

The Engineering program also promotes the Strategic Learning and Success Goals (with examples of program activities)

- *Goal SLS2: To support student access, achievement, and success* (by providing courses and support for students to earn an A.A. degree and transfer to competitive engineering universities such as Cal Poly SLO; by offering extra office hours; by seeking grants to provide financial and academic support).
- *Goal SLS3: Ensure students are directed* (ENGR 100 Intro to Engineering requires students to obtain an SEP and plan the rest of their time at AHC).
- *Goal SLS4: Ensure students are focused* (by emphasizing the importance of sufficient and quality time to study, by assigning challenging but confidence-building assignments)
- *Goal SLS5: Nurture students* (by offering extra office hours and working the MESA and STEM Center counselors, general counseling and LAP to ensure students are supported outside beyond academics. The Engr. faculty is the MESA instructional Faculty Advisor).
- *Goal SLS6: Engage students* (by assigning group projects and hands-on activities; by promoting internship opportunities)

- *Goal SLS7: Ensure students are connected* (by promoting student study groups and group projects, the MESA and STEM Programs, the Science and Engineering Club, the Math Club, and in engineering professional societies).
- *Goal SLS8: Value student contributions* (by encouraging students to participate in Friday Night Science, as tutors, and in clubs).

II. Progress Made Toward Past Program/Departmental Goals

Summarize the progress the discipline has made toward achieving its goals during the past six years. Discuss briefly the quality, effectiveness, strengths and struggles of the program and the impact on student success as reflected in past comprehensive program reviews and Annual Updates.

The progress of the program towards its goals during the past several years is summarized in the Status Summary of the previous plan of action.

For a program of its size (one full-time faculty member who is also department chair of Mathematical Sciences, and one part-time faculty member), the range of engineering courses offered is relatively large.

- ENGR 100 Introduction to Engineering (1 unit)
- ENGR 124 Excel for Science/Engineering* (1 unit)
- ENGR 126 MATLAB in Science/Engineering (1 unit)
- ENGR 152 Statics (3 units)
- ENGR 154 Dynamics* (3 units)
- ENGR 156 Strength of Materials* (4 units)
- ENGR 161 Materials Science (3 units)
- ENGR 162 Materials Science Lab (1 unit) - engineering labs are separate sections
- ENGR 170 Electric Circuit Analysis + Lab (3 units)
- ENGR 171 Electric Circuits Lab (1 unit)

Not all community colleges offer *Excel*, *Dynamics*, or *Strength of Materials*. Knowledge of spreadsheet applications (such as Excel) is vital in STEM fields. Dynamics and Strength of Materials are both offered as sophomore level courses at UCSB and Cal Poly San Luis Obispo.

The faculty, both full- and part-time (currently full-time AHC instructor who teaches full-time in Machine Technology) provide quality instruction. Professor Dal Bello (Engineering) and Assistant Professor John Gerrity (Machine Technology) are highly involved with student support activities and projects.

Since the last program review (2006), the program has steadily grown and improved in quality. Some highlights that directly impact student support:

- Moved into a new classroom/materials science laboratory (M-212)
- Obtained equipment to upgrade the ENGR 162 Material Science Lab (Item 18 in program review).
- Obtained 14 classroom sets of desktop lab equipment for ENGR 170 Electric Circuits lab, replacing old equipment in M-433. This has allowed us to standardize the setups at each station, as well as provide practice set-ups for the MESA and STEM Centers so students can use the equipment outside of lab hours. The new equipment is “owned” by the Engineering Program; previous equipment that was used was “owned” by Electronics.
- In 2020, with the expertise of the MESA Coordinator, Christine Read and STEM Counselor Angelica Eulloqui, 11 three-year academic pathway models for different engineering majors were created.
- Brought 7 grants to Allan Hancock College, either as lead institution (3), within a collaborative (linked awards where AHC has its own award) (1), or sub-awardees (3). Over $1.5 million in scholarship funds has been brought in to support STEM students.

There are ***challenges***, some being a by-product of success, including:

- The engineering faculty member is also department chair of Mathematical Sciences, a position which, although having 0.4 reassigned time, often requires more.
- There is no long-term part-time faculty pool to draw from.
- While one faculty teaching (nearly) all of the engineering courses allows the instructor to get to know the students, students are not necessarily exposed to a range of teaching styles.
- Compared to other STEM courses, Engineering courses have small unit loads, thus requiring faculty to teach more classes to reach a certain load. The grading involved in engineering courses is great.
- The single full-time faculty often has to take overloads to ensure classes are covered. In Fall 2019, with the PTF hired as the FT Machine Technology, the FTF has seven different CRNs and taught over 17 hours each week, in addition to chair responsibilities.
- The FTF, being heavily involved in grant activities, is often working 60-80-hour weeks, especially during COVID.
- There is no lab technician specifically assigned to supporting engineering labs. Basic equipment maintenance, lab set-up and clean-up, determination and searching for parts to order is done by the FTF in Engineering and the once PT Engineering Faculty now FT Machine Technology Faculty.

COVID has of course exasperated these challenges.

III. Analysis of Resource Use and Program Implementation

Describe the program's current allocation and use of human, physical, technology, and fiscal resources. Are resources sufficient and appropriate to meet program needs? Can program resources be reallocated to better meet student needs? If so, how?

STAFFING

Staffing – Instructional

The Engineering Program is staffed by one (1) full-time instructor ("Department of One"). The typical semester FTEF load is ~1.0 in Fall semester (~6 sections, including 2 labs), and ~1.2 in Spring (~7 sections, including 2 labs). The FTF Engineering faculty member is currently serving as Chair of Mathematical Sciences (Mathematics, Computer Science, Engineering and STEM), which is a 0.4 reassigned? load (actual work is more than 0.4 load).

The first part-time hire during the tenure of the current FT Engineering Faculty (since Spring 2003) was in Fall 2011.

	Full-Time Faculty Sections	Part-Time Faculty Sections
2011-12	10	5
2012-13	11	2
2013-14	12	2
2014-15	10	2
2015-16	8	6
2016-17	8	5
2017-18	10	4
2018-19	9	6
2019-20	12	2 (by FTF in another dept.

The most recent PT faculty was hired as the FT Machine Technology instructor in Fall 2019. He taught two lab sections in Engineering in Spring 2020, and two in Fall 2020. The Engineering program is fortunate to have the support and expertise of John Gerrity.

In general, continuity of PT Engineering faculty is a challenge.

Graduate programs are excellent sources for part-time faculty. Graduate students are up-to-date with current engineering education requirements, are close temporally to undergraduates, are looking for (teaching) experience/exploring teaching as a career, etc.

The closest university is Cal Poly San Luis Obispo, about 30 miles away. Cal Poly can only grant Master Degrees, so Cal Poly graduate students are not available for an extended period before graduating and often leaving the area. Also, because Cal Poly graduate students have yet to earn their master's degree, they fall under the Faculty Internship program, which requires a faculty mentor – who is likely the same person the part-timer is supposed to be replacing.

UCSB offers a potential pool of part-time faculty, many with master's degrees (or equivalent) while still pursuing a doctorate. However, UCSB is approximately 70 miles one-way. Travel eats up a lot of the meager pay that AHC can offer to part-time faculty. A Teaching Assistant in Engineering at UCSB is better compensated than a part-time faculty member teaching one course at AHC. Finding UCSB students who want to teach as a career, and who have sufficient time to commit away from their own courses and research, is difficult. The 2-hour round-trip is a high cost.

Working or retired engineers are another source of part-time faculty. Those working are only available at night, but the engineering curriculum rotates between evening and day. When engineering courses are only during the day, it is a challenge to staff engineering courses with part-time faculty. In addition, those who have practiced engineering for some time are years away from being students, and their understanding/approach to teaching is likely different than what the students and the university are expecting.

The college should consider hiring a full-time faculty member to teach in Electronics and Engineering; i.e., someone with a Masters in Electrical Engineering. This would provide for a full-time champion in the Electronics Program (2-year program), as well as provide instructional support for transfer-level engineering electric circuits courses (which tend to be one of the most enrolled sophomore-level engineering courses).

Support Staff - Technical

There is currently no lab support technician dedicated to Engineering. The Physics/Geology Lab Technician often supports basic engineering needs, but cannot support the circuits laboratory or maintain engineering equipment. The Chemistry Lab Technical supports one of the materials science experiments that requires chemicals. The Engineering Faculty – both FTF and PTF – serve as Engineering Lab Technicians – determining what equipment and supplies needs to be ordered, performing simple maintenance on equipment, doing laboratory prep-work, and lab clean up.

Before they retired (ca 2010), Electronics full-time faculty received a summer stipend to keep the electronics lab updated and in good repair. This practice has not been continued except for summer 2015, when the electronics lab needed to be cleaned out in anticipation of the move of the laboratory to the O-building; this was more of a “clean-up” of the lab than maintaining the equipment proper.

A Lab Technician to support engineering is needed. Perhaps this person can be shared with electronics, machining and other industrial technology areas. An Engineering Lab Technician has been approved to be added to the staff prioritization list. Actual hiring has not occurred.

Support Staff - Administrative

Engineering is in the Mathematical Sciences Department, which also houses Mathematics, Computer Science and the STEM disciplines. There is one full-time Academic Support Specialist (secretary) for (currently) 17 full-time faculty and approximately 23 part-time faculty.

Administrative staff should be extended to 11 months to support this large department. This request has been justified in the Mathematics Program Review/Annual Updates.

FACILITIES

Most Engineering lecture courses and the Materials Science Lab are taught in Room M-212 in the

Science building. The Electrical Circuits Lab is taught in the Electronics Lab in M-433. The Mathematical Sciences Department schedules ("owns") M-212, the Industrial Technology Department schedules ("owns") M-433.

M-212- Engineering Lab

This room was originally designed to be used as the engineering classroom and Materials Science Laboratory, as well as an overflow for physics and viticulture.

Use of M-212 as a Math classroom:

Since Fall 2013, M-212 has accommodated math classes. Up to five mathematics sections per semester have been scheduled in the engineering lab. This is not a great situation, especial when labs need to be set up ahead of time/left overnight, etc.

- F12: one section (Algebra 2)
- S13: two (Algebra 2, Calculus)
- F13: two (Algebra 2, (2))
- S14: one (Algebra 2)
- F14: four (Algebra 2 (3), Calculus)
- S15: three (Algebra 2 (2), Calculus)
- F15: four (Algebra 2 (2), Statistics, Calculus)
- S16: five (Algebra 2 (2), Statistics, Calculus, trigonometry)
- F16 three (Algebra 1, Algebra 2, Statistics)
- S17 three (Algebra 2, College Algebra, Calculus)
- F17 four (Algebra 1, Algebra 2, Statistics, Comp Science 161)
- S18 four (Algebra 1 (2), Collee Algebra, Statistics)
- F18 three (Algebra 1, College Algebra, Calculus)
- S19 five (Math for Teachers, College Algebra, Statistics (2), Stats support)
- F19 three (Math for Teachers, College Algebra, Statistics)
- S20 five (Algebra 1, Algebra 2 Support, Nature of Modern Math, Math for Teachers, College Algebra)

M-212 Environment: it is historically cold and loud.

<u>M-212 from Spring 2013 Annual Update</u>:
The primary challenge with M-212 is that the blowers tend to be on with some force, so the room would get unreasonably cold and loud. The room has been recorded to be as low at 13 to 14°C (about 56-58°F). Because of the noise, students have trouble hearing the instructor, and the instructor has trouble hearing student comments and questions. The temperature and noise were a problem throughout the Fall 2011 semester, and part-way into Spring 2012. In April 2013 the blower can be on and the classroom somewhat chilly.

<u>M-212, 2014 – present</u>
There seems to have been some improvements in 2013-2015, but during most of Spring 2014 and 2015 semesters, the blowers continued to be somewhat loud (blow forcefully during the time they are on), and the room tended to run cool (although not as cool as in previous years). It is not always easy to hear the instructor, especially when sitting in the back of the room. I can speak to this as I have sat in the back of the room to evaluate part-time instructors and to listen to guest speakers. It is also difficult for the instructor to hear the student.

Spring 2020: The blowers in M-212 should be evaluated.

There are cracks in the floor of M-212, as there are in other second-floor rooms.

M-433 - Electric Circuits Laboratory.

Until Spring 2019, the M-433 desktop electronics equipment (power supplies, function generators, digital multi-meters, oscilloscopes) belonged to the Electronics Program, which is housed in the Industrial Technology Department. Most of this equipment had been in use since before the current engineering faculty member was hired (2002). The Engineering Program had no desktop electronics equipment of its own. The equipment was beginning to fail, so not all stations had the same set of desktop equipment.

In **Fall 2017/Spring 2018** new stations/set-ups (power supplies, function generators, digital multi-meters, and oscilloscopes) were purchased with HSI-STEM and equipment prioritization funds. There are now 10 set-ups in the lab; 2 in the MESA/STEM Centers for open-access use; 1 in M-212 for demos. This laboratory room has electronics equipment on par with those at the university level.

It has been a long-term concern as to what will become of the Electronics Program and the electronics lab. The College has not hired a faculty member to replace the two full-time Electronics instructors who retired.

EQUIPMENT CURRENCY

M-212 (Materials Science Laboratory). The equipment for the **Materials Science laboratory** is generally sufficient.

- The lab has circa 2009 tensile tester (Instron 3382), which is sufficient. However, funds should be budgeted for service. In the past $500 was budgeted for the Engineering Program for “Maintenance”. This line item no longer exists. The Instron was fixed about seven years ago for about $2500 (parts and labor).
- The majority of instructional funds for engineering is spent in Materials Science, as Materials Science has a significant number of consumables (tensile specimens, models to construct, etc.).
- The HSI-STEM grant funded a new hardness tester and several hardness specimens, received in Fall 2012.
- An impact tester is (hopefully) stored somewhere on campus. The impact tester was not installed in the laboratory as it needs to be imbedded in 6 inches of concrete. Although the architect was provided with requirements for the impact tester during the design of the building, the thickness of the slab of the second floor of the Science Building is 3 inches thick. Locating the Impact Tester and finding a suitable location to put it is an on-going back-burner project.
- The program has a 3D printer (currently housed in the IT department having been used for COVID mask projects in summer 2020).

M-433 (**Electric Circuits Laboratory**)

- The circuit lab currently has up-to-date equipment to support a typical sophomore-level circuits courses.
- That stock of circuit components, as well as basic hand tools, needs to be increased.

- The COVID closure may likely require Spring 2021 lab courses to go remote. This will require the development of lab kits for each of the 30+ students likely in the course. These labs kits will likely cost several hundred dollars each, if not more.

IV. Program SLOs/Assessment

What are your program student learning outcomes? Have each of these been assessed since the last comprehensive program review? Describe changes you have made to courses or the program based on these data.

The **Program Student Learning Outcomes** are as follows:

- **PSLO 1:** Apply fundamental concepts of mathematics (through calculus), science and engineering.
- **PSLO 2:** Identify, formulate, and solve basic engineering problems.
- **PSLO 3:** Conduct experiments and analyze and interpret data.
- **PSLO 4:** Make basic design decisions concerning appropriate-level engineering problems.
- **PSLO 5:** Communicate effectively both orally and in writing, using symbols, graphics and numbers.
- **PSLO 6:** Recognize the need for, and an ability to engage in, lifelong learning.
- **PSLO 7:** Function professionally and ethically as an individual and within diverse teams.
- **PSLO 8:** Use techniques, skills and modern engineering tools necessary in engineering education and practice.

The PSLO were originally modelled after those that the four-year Engineering Programs follow, i.e., the **Accreditation Board for Engineering and Technology** (ABET) Engineering Criterion 3, Outcomes a-k (http://www.abet.org/wp-content/uploads/2015/05/E001-15-16-EAC-Criteria-03-10-15.pdf), in addition to the outcomes for AHC in general. ABET is the accreditation board for 4-year engineering programs and 2-year engineering technology programs. There is no accreditation for 2-year engineering transfer programs.

ABET recently redesigned their criteria, now 1-7 (https://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-engineering-programs-2019-2020/). The AHC Engineering PLOs still track the ABET criteria:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

All CSLOs, PSLOs and ISLOs have been linked. See Historical Associations "ISLO/PSLO Summary Map by Course", attached at the end.

Course Student Learning Outcomes

Several courses have many SLOs: Engr. 161 has 8, and Engr. 162 has 7 (recently reduced from 9 and 11, respectively). Courses and Program SLOs should be revaluated over the next program review cycle.

Figure IVa shows the Course Student Learning Outcomes data from Spring 2014 through Fall 2017. No SLOs results were recorded since Fall 2017. A summary of CSLOs, by course, is given in *Figure IVb*. A discussion of this data follows the figures.

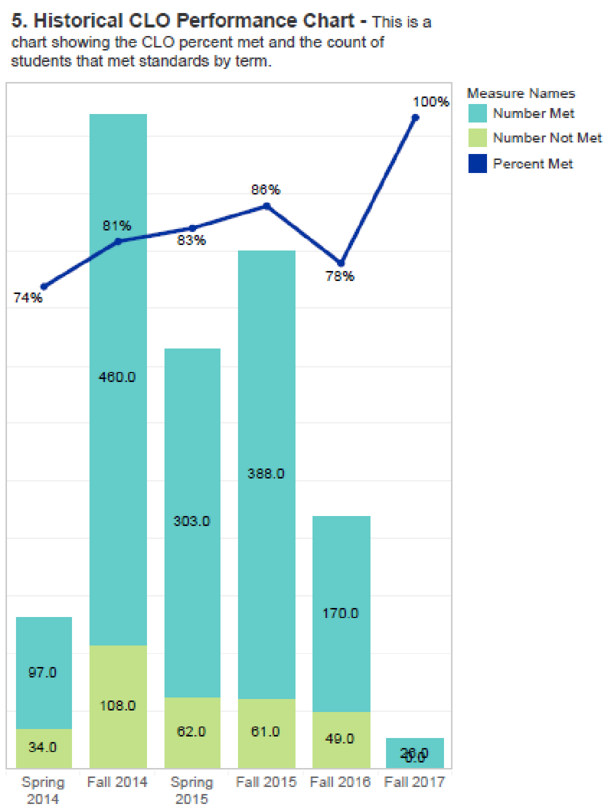


Fig. IVa Historical CLO data, by semester.

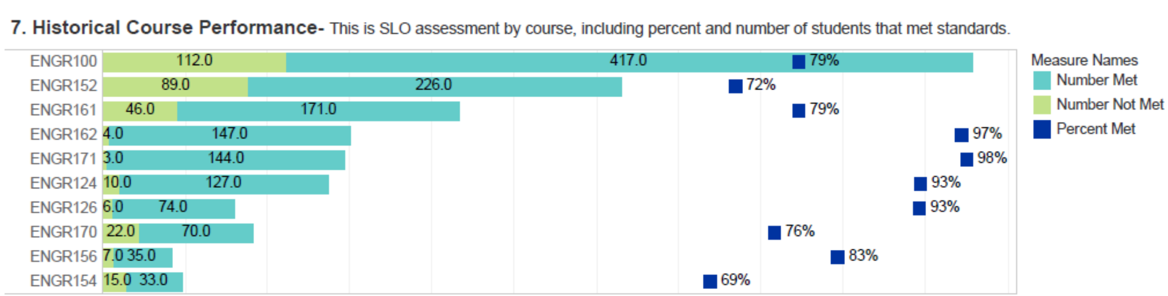


Fig. IVb Historical CLO data, course.

Current Status

The assessment of engineering SLOs has been on a hiatus since the Fall 2017 semester. The learning outcomes assessment process for engineering needs to be redesigned, especially in light of the campus decision to focus on Program Learning Outcomes. This new method will be implemented during the next Program Review cycle.

General Notes

Students tend to do well in the basic concepts of each course, but have difficulty applying advanced concepts (e.g., acceleration as a function of velocity, combined loading in a structure, etc.). This is not surprising in sophomore-level engineering courses. Students need opportunity to practice the topics in the course. This can be done within the class session (although students have long been given in-class practice in the Engineering Program), and need to study more outside of the classroom. Emphasis on students learning on their own outside of class, and group work (both in and out of class) should continue to be encouraged, more so than in the past.

CSLOs of Concern

The two SLOs that have "Meets Standards" rates below 60% are:

- ENGR 152: Generate appropriate Free Body Diagrams 58%
- ENGR 161: Associate mechanical properties of metals with their structure, defects and mechanical and thermal processing 52%

Free Body Diagrams (FBDs) have always been a challenge for students in ENGR 152 Statics. This SLO has been assessed on a problem during the final exam. While we may not have gone over that exact problem, they have seen a version like it in prerequisite courses. It might be a good idea to assess Free Body Diagrams in a FBD quiz, where several different FBDs are given so student can present the larger-view understanding.

Understanding the effect of structure, defects and processing on material properties is also a challenge. Students now must clearly describe in words the physics behind the problem, which can be a tough leap for many of them; it is no longer just a calculation. More emphasis can be placed on problems that describe what is going on; however, many students just parrot the textbook, or look up solutions online to HW problems.

One of the bigger-picture solutions to "practice time" is to "flip" the classroom. Much of the lecture material for class can be provided online, while homework and practice problems can be worked in class.

The FT Engineering Faculty member is involved in two grant projects with Cal Poly that help students develop a conceptual understanding of engineering topics using an online tool called the Concept Warehouse.

NSF Improving Undergraduate STEM Education grant (IUSE), "Collaborative Research: Understanding Context: Propagation and Effectiveness of the Concept Warehouse in Mechanical Engineering at Five Diverse Institutions and Beyond". 2018–present.

California Education Learning Lab grant: "The Mechanics of Inclusion and Inclusivity in Mechanics". 2019–present.

Implementation of the Concept Warehouse tool within class will hopefully improve student outcomes. This tool is actually being implemented in Fall 2020 in both ENGR 152 Statics and ENGR 161 Materials Science.

V. Distance Learning (If applicable):

Describe the distance education courses offered in your program and any particular successes or challenges with these courses. Include the enrollment as well as percentage of courses offered by modality and the rationale for this ratio.

N/A. No engineering courses are generally offered as Distance Learning (DL) courses.

Due to COVID, curriculum proposals have been submitted for Fall 2020 to add the DL mode to all Engineering courses, and Emergency Remote Teaching (ERT) mode to all hands-on lab courses.

Labs are very difficult to offer remotely. It may be necessary to have significant funds available to provide kits for students to take home to do experiments. This could cost several hundreds, if not thousands, per student, to support.

VI. Success, Retention, and Equity

Describe how the program works to promote student success. Include teaching innovations, use of academic and student support services (library, counseling, LAP, community partnerships, etc.). Refer to list of Student Services.

- *Then, utilizing data from the office of Institutional Research and Planning, report on student success through course completion and retention data. Analyze, by discipline, success by gender, age, ethnicity, and online (may analyze other variables such as disability, English as a second language, day vs. night courses, etc. as appropriate).*
- *Suggest possible reasons for these trends and planned actions to address any disproportionate impact.*

Note: 2019-2020 retention and success data is affected by Spring 2020's COVID challenges, which is an external affect which are beyond the scope of any program to control.

The **Retention and Success Rates (R&S Rates)** for Fall 2014-Spring 2020 are shown in *Table Va*. *Retention* is the percentage of students remaining in the class at the end of semester, *Success* is the percentage of students who pass the class (C or better); the baseline is the number of students enrolled in the class at census. As engineering courses are only offered in fall and spring (with one exception), only Fall-Spring data will be considered.

The overall Engineering R&S Rates compare favorably with the 6-year R&S Rates for the College overall from Fall '14 through Spring '20.

- Overall Engineering R&S, F14-S20 (simple average)................................88% / 77%
- Overall College R&S, F14-S20 (simple average)......................................80% / 73%

Engineering has two levels of courses: (1) Intro to Engineering (a freshman-level, course introducing students to the various fields, a "PD" for STEM majors), and (2) sophomore level engineering courses, considered among the most difficult on campus.

The R&S rates for sophomore-level Engineering lecture courses (ENGR 152 Statics, 154 Dynamics, 156 Strength of Materials; 161 Materials Science; 170 Electric Circuit Analysis) from Fall 2006 through Spring 2020 are listed in *Table Vb*. The weight average R&S for the 14- and 6-year periods are shown below:

- Sophomore Engineering R&S, F06-S20 (weighted average) ....88% / 78%
- Sophomore Engineering R&S, F14-S20 (weighted average) ....89% / 80%

The average section sizes over both the 14- and 6-year periods are 22.

While engineering courses are considered among the most difficult on the campus, the students who reach these courses are (1) highly motivated; and (2) have already made it through a difficult set of courses.

Table Va. <u>Enrollment</u>, <u>Retention Rates</u> (%) and **<u>Success Rates</u> (%);**
Engineering Program and AHC, Fall 2014-Spring 2020.

1 Outcomes ENGR

course_
All

EW Grade
Exclude EW

	Fall 2014	Spring 2015	Fall 2015	Spring 2016	Sum 2016	Fall 2016	Spring 2017	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019	Spring 2020
Sections	6	6	6	6	1	5	8	8	7	7	7	7	7
Headcount	95	73	100	70	6	89	95	123	99	119	92	127	85
Enrollment	131	104	125	106	6	130	145	208	185	159	137	187	135
retained	114	88	102	94	5	108	136	185	170	135	123	164	101
Retention %	87%	85%	82%	89%	83%	83%	94%	89%	92%	85%	90%	88%	96%
success	98	85	91	83	5	97	121	173	153	104	108	144	101
Success %	75%	82%	73%	78%	83%	75%	83%	83%	83%	65%	79%	77%	96%
FTES	10.4	7.4	8.8	9.1	0.6	12.4	11.8	17.4	15.8	11.9	12.2	14.2	10.6

Outcomes Allan Hancock College Credit

	Sum 2014	Fall 2014	Spring 2015	Sum 2015	Fall 2015	Winter 2016	Spring 2016	Sum 2016	Fall 2016	Winter 2017	Spring 2017
Sections	306	1,141	1,209	355	1,177	41	1,220	357	1,184	41	1,214
Headco..	5,185	11,084	11,249	5,593	10,982	1,051	11,341	4,354	12,111	1,023	11,636
Enrollm..	8,168	29,153	28,984	8,789	28,471	1,270	28,153	8,305	29,268	1,314	28,161
Retention %	89%	87%	85%	90%	86%	84%	89%	90%	88%	87%	88%
Success %	78%	70%	71%	77%	70%	71%	73%	80%	71%	77%	74%
FTES	944	3,900	4,048	1,009	3,807	111	3,715	967	4,197	115	4,020

	Sum 2017	Fall 2017	Winter 2018	Spring 2018	Sum 2018	Fall 2018	Winter 2019	Spring 2019	Sum 2019	Fall 2019	Winter 2020	Spring 2020
Sections	333	1,168	45	1,186	270	1,145	47	1,159	299	1,208	46	1,212
Headco..	5,306	11,889	1,118	11,320	4,596	11,380	1,171	10,580	4,940	12,091	1,198	11,342
Enrollm..	8,052	28,754	1,480	26,960	6,868	28,650	1,535	26,193	7,252	30,166	1,586	26,977
Retention %	90%	87%	87%	88%	90%	87%	88%	88%	92%	88%	87%	92%
Success %	80%	71%	79%	74%	80%	71%	79%	74%	81%	72%	75%	85%
FTES	900	4,126	139	3,869	835	4,061	169	3,827	846	4,136	138	3,763

Table Vb. Enrollment, Retention Rates (%) and Success Rates (%) in Sophomore-Level Engineering Lecture Courses, Fall 2006 – Spring 2020

ENGR		'06-'07	'07-'08	'08-'09	'09-'10	'10-'11	'11-'12	'12-'13	'13-'14
152	Statics	**26** 77% 73%	**22** 91% 91%	**26** 77% 73%	**28** 89% 75%	**32** 94% 69%	**35** 91% 89%	**27** 81% 78%	**30** 77% 70%
154	Dynamics	**19** 95% 89%	**16** 100% 94%	**11** 100% 82%	**12** 67% 50%	**25** 88% 60%	**27** 93% 85%	**18** 89% 61%	**16** 81% 75%
156	Strength of Materials	**15** 93% 73%	**14** 86% 79%	**10** 90% 80%	**15** 100% 47%	**20** 90% 75%	**24** 96% 67%	**14** 93% 57%	**14** 100% 100%
161	Materials Science	**14** 93% 86%	**11** 91% 91%	**14** 86% 86%	**23** 96% 65%	**28** 93% 86%	**32** 84% 81%	**36** 94% 86%	**26** 96% 85%
170	Electric Circuits	**25** 88% 84%	**22** 82% 73%	**20** 95% 85%	**24** 79% 67%	**26** 88% 73%	**36** 75% 69%	**35** 80% 77%	**38** 79% 66%
	Enrollment Ave. Retent. Ave. Success	**99 88% 81%**	**85 90% 85%**	**81 88% 80%**	**102 87% 64%**	**131 91% 73%**	**154 87% 79%**	**130 87% 75%**	**124 85% 76%**
	Average Section Size	**20**	**17**	**16**	**20**	**26**	**31**	**26**	**25**

ENGR		'14-'15	'15-'16	'16-'17	'17-'18	'18-'19	'19-'20*	14-year History	Ave Section Size
152	Statics	**24** 83% 67%	**20** 85% 85%	**39** 79% 72%	**44** 89% 77%	**28** 79% 50%	**31** 81% 71%	**412** 84% 74%	**29**
154	Dynamics	**15** 80% 80%	**9** 89% 89%	**17** 94% 88%	**24** 92% 83%	**14** 100% 93%	**14** 90% 90%	**237** 90% 79%	**17**
156	Strength of Materials	**9** 89% 78%	**11** 82% 82%	**17** 100% 88%	**30** 97% 87%	**9** 100% 89%	**11** 100% 100%	**213** 94% 78%	**15**
161	Materials Science	**14** 79% 79%	**16** 88% 81%	**26** 88% 69%	**35** 91% 91%	**21** 81% 71%	**29** 86% 76%	**325** 89% 81%	**23**
170	Electric Circuits	**26** 88% 69%	**26** 92% 62%	**32** 96% 85%	**29** 93% 86%	**23** 100% 96%	**24** 100% 100%	**386** 87% 77%	**28**
	Enrollment Ave. Retent. Ave. Success	**88 84% 73%**	**82 88% 77%**	**131 90% 79%**	**162 92% 84%**	**95 90% 76%**	**109 90% 84%**	**1,573 88% 78%**	**22**
	Average Section Size	**18**	**16**	**26**	**32**	**19**	**24**	**22**	

Note: [1] ENGR 161 was offered Spring, and ENGR 170 in Fall, until the '15-'16 academic year.
[2] Starting '15-'16: ENGR 161 was offered in Spring, ENGR 170 was 71 was offered in Fall.
[3] Spring 2020 COVID. Retention and Success numbers for ENGR 154, 156 and 170 have been affected by EW withdrawals.

Retention and Success by Ethnicity

Digging into the data for the most recent academic year, 2019-20, Hispanics have a Modified Retention Gap (modified) of –5.4%. Sadly, this is over twice that of the college Modified Hispanic Retention Gap (–2.2%).

On the other hand, the Modified Hispanic Success gap is only –2.6%, half of that of the college Modified Hispanic Success Gap (–5.4%).

Regardless, this gives food for thought for considering ways to improve both retention and success for all students. The AHC engineering and physics faculty are currently working on California Education Learning Lab grant with Cal Poly San Luis Obispo called "The Mechanics of Inclusion and Inclusivity in Mechanics" The engineering faculty is also writing a National Science Foundation Louis Stokes Alliances in Minority Participation Grant, which include Learning Facilitators and mentoring for underrepresented minority students.

Table Vc

3 Program Equity Outcomes ENGR

Percentage Point Gap (PPG)-compare a group outcome to the overall outcome, if group is 3% less or lower than overall then group is disproportionately impacted.

PPG Mod-same as PPG except overall outcome is modified to NOT include group outcome.

PPG Impact-amount of students needed to have a positive outcome in order to have the group reach equity.

Equity Outcomes only work for a single subject. Contact IE to get data for multiple subjects

	Academic Year 2019-20									
	Headcount	Enrollment	EW count	FTES	Retention %	PPG Retention Mod	PPG Retention Impact	Success %	PPG Success Mod	PPG Success Impact
Asian	3	3	0	0.1	100.0%			66.7%		
Filipino	7	15	1	1.1	100.0%			100.0%		
Hispanic	102	199	24	16.3	88.6%	-5.4%	11	82.9%	-2.6%	6
Native Am	2	14	0	1.5	100.0%			100.0%		
White	64	90	5	5.7	91.8%	1.4%		81.2%	-3.8%	4
Unknown	1	1	0	0.0	100.0%			100.0%		
Grand Total	**179**	**322**	**30**	**24.8**	**90.8%**			**83.9%**		

Table Vd

3 Allan Hancock College Credit Equity Outcomes

Equity:
Percentage Point Gap (PPG)-compare a group outcome to the overall outcome, if group is 3% less or lower than overall then group is disproportionately impacted.
PPG Mod-same as PPG except overall outcome is modified to NOT include group outcome.
PPG Impact-amount of students needed to have a positive outcome in order to have the group reach equity

	Academic Year 2019-20						
	Headcount	Enrollment	EW count	FTES	Retention %	PPG AHC Retention Mod	PPG AHC Retention Impact
Asian	378	1,366	84	187	90.2%	0.3%	
Black	491	1,928	176	278	88.8%	-1.1%	22
Filipino	488	1,813	134	259	91.2%	1.4%	
Hispanic	7,536	30,439	2,709	4,047	88.7%	-2.2%	671
Native Am	360	1,475	151	190	85.9%	-4.1%	60
Other	2	7	0	1	100.0%		
Pac Isl	167	663	73	81	88.6%	-1.2%	8
White	7,129	26,825	1,707	3,648	91.3%	2.5%	
Unknown	516	1,465	167	190	90.8%	0.9%	
Grand Total	**17,034**	**65,981**	**5,201**	**8,881**	**89.9%**		

Table Ve

3 Allan Hancock College Credit Equity Outcomes

Equity:
Percentage Point Gap (PPG)-compare a group outcome to the overall outcome, if group is 3% less or lower than overall then group is disproportionately impacted.
PPG Mod-same as PPG except overall outcome is modified to NOT include group outcome.
PPG Impact-amount of students needed to have a positive outcome in order to have the group reach equity

	Academic Year 2019-20						
	Headcount	Enrollment	EW count	FTES	Success %	PPG AHC Success Mod	PPG AHC Success Impact
Asian	378	1,366	84	187	79.5%	1.4%	
Black	491	1,928	176	278	75.2%	-3.0%	58
Filipino	488	1,813	134	259	80.0%	2.0%	
Hispanic	7,536	30,439	2,709	4,047	75.2%	-5.4%	1,636
Native Am	360	1,475	151	190	73.9%	-4.3%	64
Other	2	7	0	1	100.0%		
Pac Isl	167	663	73	81	72.4%	-5.8%	38
White	7,129	26,825	1,707	3,648	81.7%	6.2%	
Unknown	516	1,465	167	190	76.9%	-1.2%	18
Grand Total	**17,034**	**65,981**	**5,201**	**8,881**	**78.1%**		

Retention and Success by Gender

In 2019-20, female students have a Modified Retention Gap (modified) of –6.8% and Modified Success Gap of –5.2%. This is a significant area for concern. The implications here is that female students are not feeling connected. Fortunately, the number of students needed to close the gap is small (4), but this also implies that the female population is small.

The relevant college gaps for female students are:
Modified Retention Gap: –0.9, and the Modified Success Gap is +0.8% (i.e., no gap).

Table Vf

3 Program Equity Outcomes ENGR

Percentage Point Gap (PPG)-compare a group outcome to the overall outcome, if group is 3% less or lower than overall then group is disproportionately impacted.
PPG Mod-same as PPG except overall outcome is modified to NOT include group outcome.
PPG Impact-amount of students needed to have a positive outcome in order to have the group reach equity.

Equity Outcomes only work for a single subject. Contact IE to get data for multiple subjects

	Academic Year 2019-20									
	Headcount	Enrollment	EW count	FTES	Retention %	PPG Retention Mod	PPG Retention Impact	Success %	PPG Success Mod	PPG Success Impact
Female	28	56	2	4.5	85.2%	-6.8%	4	79.6%	-5.2%	3
Male	148	263	27	20.3	91.9%	6.2%		84.7%	4.4%	
Unknown	3	3	1	0.1	100.0%			100.0%		
Grand Total	179	322	30	24.8	90.8%			83.9%		

Table Vg

3 Allan Hancock College Credit Equity Outcomes

Equity:
Percentage Point Gap (PPG)-compare a group outcome to the overall outcome, if group is 3% less or lower than overall then group is disproportionately impacted.
PPG Mod-same as PPG except overall outcome is modified to NOT include group outcome.
PPG Impact-amount of students needed to have a positive outcome in order to have the group reach equity

	Academic Year 2019-20						
	Headcount	Enrollment	EW count	FTES	Retention %	PPG AHC Retention Mod	PPG AHC Retention Impact
Female	8,967	36,046	2,443	4,909	89.4%	-0.9%	337
Male	7,769	29,148	2,626	3,869	90.4%	0.9%	
Unknown	302	787	132	103	90.5%	0.7%	
Grand Total	17,034	65,981	5,201	8,881	89.9%		

Table Vh

3 Allan Hancock College Credit Equity Outcomes

Equity:
Percentage Point Gap (PPG)-compare a group outcome to the overall outcome, if group is 3% less or lower than overall then group is disproportionately impacted.
PPG Mod-same as PPG except overall outcome is modified to NOT include group outcome.
PPG Impact-amount of students needed to have a positive outcome in order to have the group reach equity

	Academic Year 2019-20						
	Headcount	Enrollment	EW count	FTES	Success %	PPG AHC Success Mod	PPG AHC Success Impact
Female	8,967	36,046	2,443	4,909	78.5%	0.8%	
Male	7,769	29,148	2,626	3,869	77.7%	-0.7%	193
Unknown	302	787	132	103	74.2%	-3.9%	31
Grand Total	17,034	65,981	5,201	8,881	78.1%		

Retention and Success by Age

In 2019-20, student under 20 years of age have a Modified Retention Gap (modified) of –7.3% and a Modified Success Gap of –14.9%. Most of these drops and non-successes come from ENGR 100 Introduction to Engineering, which is principally made up of first-year students. This is a one-unit personal development/academic skills class. While the course may not be difficult, it only meets once per week, and requires consistent work outside of class.

The relevant college gaps are:
Modified Retention Gap: 0.9% (i.e., no gap), and the Modified Success Gap is –3.6%.

Table Vi

3 Program Equity Outcomes ENGR

Percentage Point Gap (PPG)-compare a group outcome to the overall outcome, if group is 3% less or lower than overall then group is disproportionately impacted.
PPG Mod-same as PPG except overall outcome is modified to NOT include group outcome.
PPG Impact-amount of students needed to have a positive outcome in order to have the group reach equity.

Equity Outcomes only work for a single subject. Contact IE to get data for multiple subjects

	Academic Year 2019-20									
	Headcount	Enrollment	EW count	FTES	Retention %	PPG Retention Mod	PPG Retention Impact	Success %	PPG Success Mod	PPG Success Impact
Under 20	83	96	5	4.4	85.7%	-7.3%	8	73.6%	-14.9%	15
20-24	65	158	15	14.6	91.6%	1.7%		87.4%	6.9%	
25-29	21	33	5	2.6	92.9%	2.3%		82.1%	-1.9%	1
30-34	7	28	4	2.8	100.0%			100.0%		
35-39	2	3	1	0.1	100.0%			100.0%		
40-49	1	1	0	0.0	100.0%			100.0%		
50+	3	3	0	0.2	100.0%			100.0%		
Grand Total	179	322	30	24.8	90.8%			83.9%		

Table Vj

3 Allan Hancock College Credit Equity Outcomes

Equity:
Percentage Point Gap (PPG)-compare a group outcome to the overall outcome, if group is 3% less or lower than overall then group is disproportionately impacted.
PPG Mod-same as PPG except overall outcome is modified to NOT include group outcome.
PPG Impact-amount of students needed to have a positive outcome in order to have the group reach equity

	Academic Year 2019-20						
	Headcount	Enrollment	EW count	FTES	Retention %	PPG AHC Retention Mod	PPG AHC Retention Impact
Under 20	7,482	28,282	2,460	3,583	90.4%	0.9%	
20-24	4,867	20,725	1,537	2,853	88.8%	-1.6%	330
25-29	2,060	7,055	437	1,089	89.4%	-0.5%	38
30-34	1,130	3,508	196	507	91.3%	1.5%	
35-39	844	2,403	154	342	90.2%	0.4%	
40-49	874	2,442	235	324	91.1%	1.3%	
50+	583	1,566	182	185	91.5%	1.7%	
Grand Total	17,034	65,981	5,201	8,881	89.9%		

Table Vk

3 Allan Hancock College Credit Equity Outcomes

Equity:
Percentage Point Gap (PPG)-compare a group outcome to the overall outcome, if group is 3% less or lower than overall then group is disproportionately impacted.
PPG Mod-same as PPG except overall outcome is modified to NOT include group outcome.
PPG Impact-amount of students needed to have a positive outcome in order to have the group reach equity

	Academic Year 2019-20						
	Headcount	Enrollment	EW count	FTES	Success %	PPG AHC Success Mod	PPG AHC Success Impact
Under 20	7,482	28,282	2,460	3,583	76.0%	-3.6%	1,024
20-24	4,867	20,725	1,537	2,853	77.6%	-0.7%	144
25-29	2,060	7,055	437	1,089	79.6%	1.7%	
30-34	1,130	3,508	196	507	83.5%	5.8%	
35-39	844	2,403	154	342	82.9%	5.0%	
40-49	874	2,442	235	324	85.6%	7.8%	
50+	583	1,566	182	185	83.3%	5.3%	
Grand Total	17,034	65,981	5,201	8,881	78.1%		

Retention and Success by Status

In 2019-20, the first-year data follows the age data. First-year students of age have a Modified Retention Gap (modified) of –4.8% and a Modified Success Gap of –12.6%. Most of these drops and non-successes come from ENGR 100 Introduction to Engineering, which is principally made up of young students. This is a one-unit personal development/academic skills class. While the course may not be difficult, it only meets once per week, and requires consistent work outside of class.

The relevant college gaps are:
Modified Retention Gap: –2.9%, and the Modified Success Gap is –14.9%.

Table Vl

3 Program Equity Outcomes ENGR

Percentage Point Gap (PPG)-compare a group outcome to the overall outcome, if group is 3% less or lower than overall then group is disproportionately impacted.
PPG Mod-same as PPG except overall outcome is modified to NOT include group outcome.
PPG Impact-amount of students needed to have a positive outcome in order to have the group reach equity.

Equity Outcomes only work for a single subject. Contact IE to get data for multiple subjects

	Academic Year 2019-20									
	Headcount	Enrollment	EW count	FTES	Retention %	PPG Retention Mod	PPG Retention Impact	Success %	PPG Success Mod	PPG Success Impact
First Time	53	53	0	1.7	86.8%	-4.8%	3	73.6%	-12.6%	7
First Time Tran..	6	7	2	0.5	100.0%			100.0%		
Continuing	116	254	28	22.0	91.2%	1.8%		85.4%	6.6%	
Returning	6	8	0	0.6	100.0%			100.0%		
Grand Total	179	322	30	24.8	90.8%			83.9%		

Table Vm

3 Allan Hancock College Credit Equity Outcomes

Equity:
Percentage Point Gap (PPG)-compare a group outcome to the overall outcome, if group is 3% less or lower than overall then group is disproportionately impacted.
PPG Mod-same as PPG except overall outcome is modified to NOT include group outcome.
PPG Impact-amount of students needed to have a positive outcome in order to have the group reach equity

	Academic Year 2019-20						
	Headcount	Enrollment	EW count	FTES	Retention %	PPG AHC Retention Mod	PPG AHC Retention Impact
First Time	2,748	9,927	213	1,241	87.4%	-2.9%	290
First Time Tran..	1,674	3,393	172	488	92.2%	2.5%	
Continuing	9,472	42,926	4,002	6,043	89.4%	-1.4%	581
Returning	2,235	4,167	302	504	88.1%	-1.9%	78
Special Admit	3,739	5,565	511	605	98.1%	9.0%	
Unknown	2	3	1	0	100.0%		
Grand Total	17,034	65,981	5,201	8,881	89.9%		

Table Vn

3 Allan Hancock College Credit Equity Outcomes

Equity:
Percentage Point Gap (PPG)-compare a group outcome to the overall outcome, if group is 3% less or lower than overall then group is disproportionately impacted.
PPG Mod-same as PPG except overall outcome is modified to NOT include group outcome.
PPG Impact-amount of students needed to have a positive outcome in order to have the group reach equity

	Academic Year						
	2019-20						
	Headcount	Enrollment	EW count	FTES	Success %	PPG AHC Success Mod	PPG AHC Success Impact
First Time	2,748	9,927	213	1,241	65.6%	-14.9%	1,481
First Time Tran..	1,674	3,393	172	488	81.6%	3.7%	
Continuing	9,472	42,926	4,002	6,043	79.4%	3.6%	
Returning	2,235	4,167	302	504	75.9%	-2.3%	96
Special Admit	3,739	5,565	511	605	91.7%	14.8%	
Unknown	2	3	1	0	100.0%		
Grand Total	**17,034**	**65,981**	**5,201**	**8,881**	**78.1%**		

VII. Trend Analyses/Outlook

Using the information already gathered in the Annual Updates s (e.g., enrollment and achievement data; student learning outcomes assessment and analysis; input by advisory boards; existing articulation agreements; labor market trends) summarize the major trends, challenges, and opportunities that have emerged in the program since the last comprehensive program review. Explain possible causes for any identified gaps or trends and actions taken or needed to address these.

Demographics

In terms of **Ethnicity**, the percentage of Hispanic/Latino students in Engineering has long been ***greater than*** the College as a whole (*Table VIIa*). In '17-'18, 57% of engineering students were Hispanic/Latino, compared to 43% in the college (a ratio of 1.4 = 57/43; i.e., the "60%" is 28% greater than "47%"). Much of the success in recruiting Hispanics student to Engineering can be attributed to the successful MESA program that works in cooperation with the Math and Science departments.

Table VIIa. Ethnicity, F14-S20 Percentage ENGR Program / Percentage AHC

	'14-'15	**'15-'16**	**'16-'17**	**'17-'18**	**'18-'19**	**'19-'20**
Engr Headcount	**143**	**151**	**148**	**176**	**179**	**178**
AHC Headcount	16,706	17,014	17,230	17,274	15,626	16,551
Percentage	**ENGR/ AHC**	**ENGR/ AHC**	**ENGR/ AHC**	**ENGR/ AHC**	**ENGR/ AHC**	**ENGR/ AHC**
Asian	7/4	9/3	3/3	2/3	2/2	2/2
Black	1/4	1/4	0/3	1/3	0/3	0/3
Filipino	3/3	6/3	3/3	5/3	4/3	4/3
Hispanic (ratio of ENGR:AHC percentages)	59/48 **1.2**	56/48 **1.2**	68/48 **1.4**	**57/43 1.4**	**58/42 1.4**	**57/46 1.3**
Native American	2/2	2/2	1/2	2/2	4/2	1/2
Unknown	0/0	0/0	0/0	0/	0/	0/
Pacific Islander	1/1	1/1	1/1	1/1	1/1	0/1
White	27/40	26/40	24/41	32/45	31/46	36/43

By **Gender**, the female enrollment is relatively small, and has varied from 15 to 24% over the past six years (*Table VIIb*). A female enrollment of 15-20% is typical at the university level across the nation. The college female population is slightly more than 50%.

Table VIIb. Gender, F14-S20. Head count from gender counts: **Female, Male, Unknown**

	'14-'15	**'15-'16**	**'16-'17**	**'17-'18**	**'18-'19**	**'19-'20**
Engr. Headcount	143	151	148	175	179	178
AHC Headcount	16,701	17,006	17,217	17,244	15,602	16,526
Gender, Percentage	**F/M/U**	**F/M/U**	**F/M/U**	**F/M/U**	**F/M/U**	**F/M/U**
Engineering (%)	21/78/1	16/83/1	24/76/1	20/78/2	15/85/0	16/83/2
College (%)	49/51/0	49/51/0	51/48/1	52/47/1	54/45/1	53/46/1

By Age, the typical Engineering student is the traditional-age college student. Over 80% of engineering students are under age 24, while for the college, that number is below 70%.

Table VIIc. Age, F14-S20. Age data broken into three ranges: **≤ 24 / 25-29 / ≥ 30 yrs old**

Age*	**'14-'15**	**'15-'16**	**'16-'17**	**'17-'18**	**'18-'19**	**'19-'20**
Engr. Headcount	145	155	149	181	184	182
AHC Headcount	17,565	17,867	18,079	18,097	16,486	17,840
Engineering (Percentage	80/12/08	81/14/06	82/13/05	81/14/05	85/11/04	81/12/07
College (Percentages)	59/15/26	59/14/26	64/13/23	65/13/22	67/13/20	69/12/19

The typical Engineering student:

- is likely Hispanic (57%+)
- is Male (76%+)
- is under 24 years of age (80%+)
- goes to school Full-time (~70% vs. ~30% college-wide, pre-S2012 data)

ENROLLMENTS

The enrollments history since Fall 2006 is shown in *Table VIId*. Engineering enrollment can be somewhat cyclic, although enrollment has tended to increase over the years. This trend is better seen in *Figure VIIa*, which plots duplicate enrollment of ENGR 152 Statics and ENGR 170 Electric Circuit Analysis. ENGR 152 and ENGR 170 are the standard sophomore level classes required of most engineering majors (either one or both).

Table. VIId. Duplicate Enrollment and FTES; ***Fall-Spring Only***, F2006-F2020

	'06-07	**'07-08**	**'08-09**	**'09-10**	**'10-11**	**'11-12**	**'12-13**	**'13-14**
Enrollment								
Engineering	246	202	212	239	282	329	321	316
College	56,715	58,612	60,729	62,319	65,320	60,207	58,165	57,981
FTES								
Engineering	18.1	15.5	15.9	19.0	24.7	29.2	26.2	26.1
College	?	?	9,621	8,724	8,401	7,784	7,588	7,720

	'14-15	**'15-16**	**'16-17**	**'17-18**	**'18-19**	**'19-20**	**1-yr Change**	**5-yr Change**
Enrollment								'14-15 to '19-20
Engineering	235	231	281*	393	296	322	**26 (8.8%)**	**87 (37%)**
College	58,137	56,624	57,429	55,714	54,843	57,143	**2,300 (4.2%)**	**–944 (–1.7)%**
FTES								
Engineering	17.8	17.9	24.8*	33.2	24.1	24.8	**0.7 (2.9%)**	**5.0 (39%)**
College	7,948	7,522	8,217	7,995	7,918	7,899	**–19 (–0.2%)**	**–49 (–0.6%)**

*Includes a summer 2016 ENGR 170 Electric Circuits section.

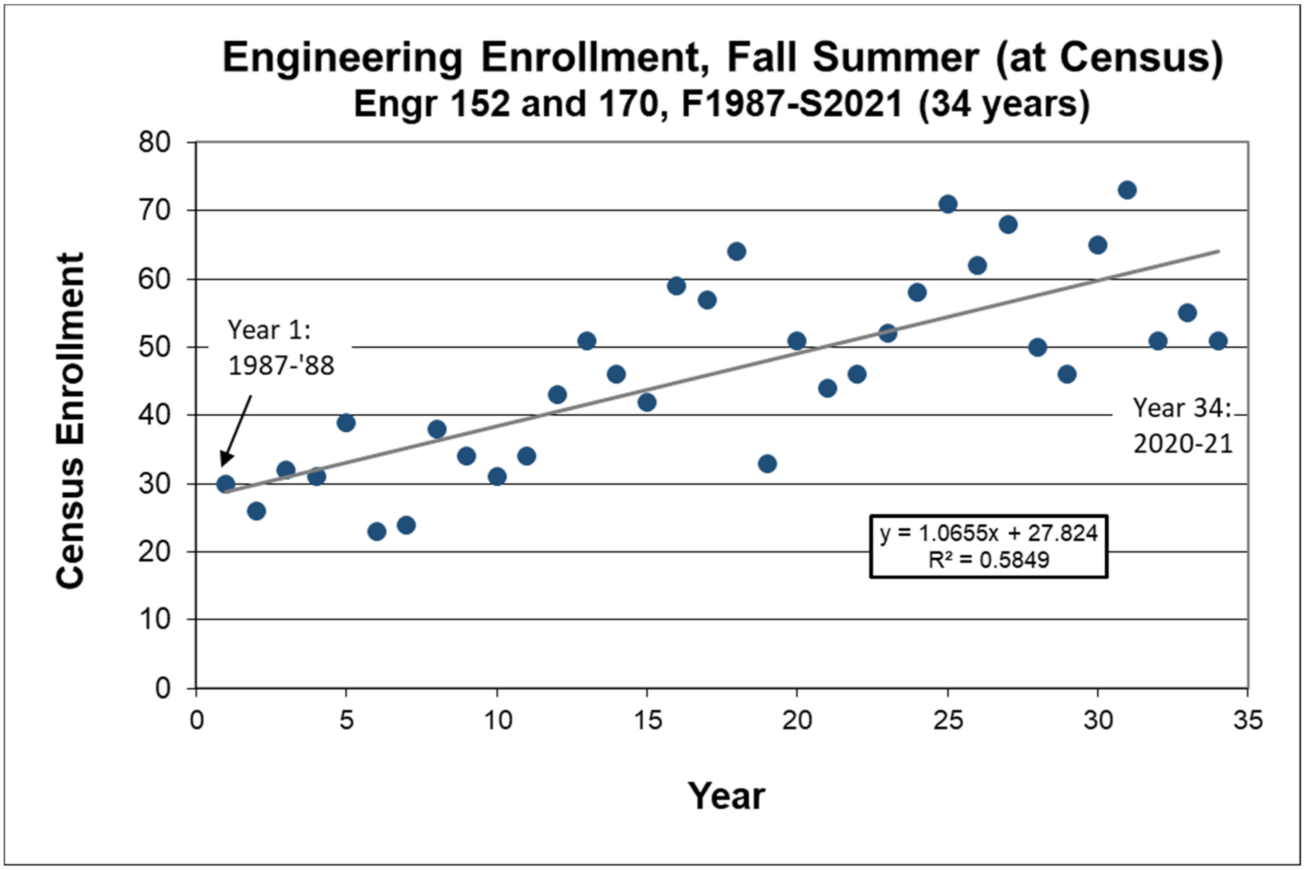


Figure VIIa. Historical Enrollment, ENGR 152 (Statics) and ENGR 170 (Electric Circuits).

DEGREES

Engineering has an Associate of Arts (AA) degree, but not an Associate of Science – Transfer (AST) degree. Engineering is a high-unit major and thus an AS-T has not been possible; it does not exist at the state level.

Since 2006-07, 151 Engineering AA's have been awarded, which is 1.1% of all AHC AA, AA-T and AS-T degrees (12,805). Note: AS degrees are not included in this comparison.

Table VIIe. AA, AA-T, and AS-T Degrees, 2006-2019 (summer-spring) - Engineering has no AS-T degree. NOTE: AS is not included.

	'06-'07	'07-'08	'08-'09	'09-'10	'10-'11	'11-'12	'12-'13	'13-'14
Engineering, AA	6	8	7	4	15	10	14	16
College, AA, AA-T, AS-T	837	757	740	632	732	627	682	849

	'14-'15	'15-16	'16-17	'17-18	'18-19	'19-20	Total
Engineering, AA	10	12	7	19	13	11	152
College, AA, AA-T, AS-T	935	903	989	1038	1185	1898	12,804

The impact of the Engineering Program on degrees is more than 1.1%. Engineering students generally earn more than one AA/AS/AA-T/AS-T. While multiple degrees in a year does not help with respect to the new funding formula, the total number of degrees earned by engineering students shows the influence to the program on other programs in the college.

Two measures of "degree efficiency" may be considered to measure impact: (1) the total degrees earned by students earning engineering degrees compared to total AHC degrees, and (2) total degrees earned by Engr AA-recipients per engineering faculty FTEF (*Table VIIf*).

As an example of the first measure, 6.9% of all degrees (1 in 16) in 2017-18 were awarded to students who received an engineering degree that year.

As an example of the second, in 2018-19, there were:

- 5.5 engineering degrees awarded per engineering FTEF
- 30.5 total degrees awarded to Engr AA recipients engineering FTEF

Table VIIf. Degree Efficiency: Total AA/AS/AA-T/AS-T Degrees Earned by Engineering AA Recipients, 2014-2020

	'14-'15	**'15-16**	**'16-17**	**'17-18**	**'18-19**	**'19-20**	**Total**
Engineering, AA	10	12	7	19	13	11	72*
Total Degrees earned by Engineering AA recipients	50	47	33	96	72	46	344
College, AA, AS, AA-T, AS-T	1253	1210	1336	1383	1535	2233	8950
% of all degrees earned by engineering degree recipients	**4.0%**	**3.9%**	**2.5%**	**6.9%**	**4.7%**	**2.1%**	**3.8%**
FTEF Engineering	2.02	1.99	2.32	2.29	2.36	2.28	13.26
FTEF AHC	744.25	773.98	768.07	755.59	735.40	729.29	4506
% of FTEF in Engineering vs. College	0.27%	0.26%	0.30%	0.30%	0.32%	0.31%	0.29%
(Engr AA)/(Engr FTEF)	5.0	6.0	3.0	8.3	5.5	4.8	5.4
(All degrees earned by Engr AA recipients)/(Engr FTEF)	24.8	23.6	14.2	41.9	30.5	20.2	25.94
(Total AHC degrees)/(AHC FTEF)	1.68	1.56	1.74	1.83	2.09	3.06	1.99

As applicable, please address the breadth, depth, currency, and cohesiveness of the curriculum in relation to evolving employer needs and/or transfer requirements, as well as other important pedagogical or technology -related developments and actions taken or needed to address these.

The Engineering Program is a transfer program, and as such the faculty works closely with administration and faculty at neighboring universities and at other California Community Colleges. All sophomore-level courses articulate to Cal Poly SLO; all but two articulates to UCSB (Materials Science, where it is taught in the junior year; Electric Circuits Analysis and lab articulates to UCSB's Mechanical Engineering courses, but not to the Electrical Engineering courses as the Electrical Engineering department cancelled all articulations with community colleges in 2017).

AHC Engineering Professor Dominic Dal Bello works with both UCSB and Cal Poly on various scholarship, internship, and instructional improvement grants. He also maintains strong working relationships with academic support personnel at each campus.

Professor Dal Bello is an active member of the following groups/organizations:

California Engineering Liaison Council (ELC) (http://www.caelc.org/)

- ELC is composed of CCC Engineering Faculty, and Engineering administrators and faculty from CSUs, UCs and private schools.
- ELC meets once per semester to discuss transfer, articulation and student preparation issues, and advocate for smoother transfer transitions. ELC has been the primary group working on Engineering Model Curriculum and C-ID descriptors (SB1440) from the CCC side.
- AHC hosted ELC in Spring 2014.

Course Identification Number System

- Prof. Dal Bello authored one of the Engineering C-IDs (ENGR 240).
- Prof. Dal Bello serves as a COR reviewer.
- Prof. Dal Bello is a member of the Faculty Discipline Review Group (FDRG) for Engineering.

American Society of Engineering Education (ASEE) (https://www.asee.org/)

- Pacific Southwest Section (ASEE/PSW)
    - Prof. Dal Bello has been Vice Chair, Community Colleges, since Fall 2012. The board, composed of UC, CSU and private university faculty meet twice per year. A conference is held every spring.
    - Prof. Dal Bello won the 2012 Outstanding Community College Educator Award.
- ASEE, National Organization
    - Prof. Dal Bello was elected Chair of the Two-Year College Division in June 2020. He was conference Program Chair 2018-2020, and Vice Chair 2016-2018.
    - Prof. Dal Bello has served as a reviewer for conference abstracts/papers for several years.

VIII. Long-Term Program Goals and Action Plans (Aligned With the College Educational Master Plan)

Describe the long-term plans for changing or developing new courses and programs, other actions being taken to enhance student success, and the need for professional development activities and other resources to implement program goals. Be sure to show how these plans are related to assessment results. (Plan should cover five- year period and include target dates and resources needed.)

Alignment of Courses with C-ID

- In 2018, **ENGR 152** *Statics*, **ENGR 154** *Dynamics*, **ENGR 156** *Strength of Materials*, **ENGR 161/162** *Materials Science/Lab*, and ENGR **170/171** *Electric Circuits Analysis/Lab* were all updated to match the C-ID descriptors.
- All have been C-ID approved except ENGR 152. There is a pre-req of the non-calculus physics mechanics course that is the physics requirement for many architecture majors; this physics pre-req does not meet the C-ID descriptor.
- **Planned Action**: Check Architecture programs to see if non-calculus physics mechanics is still the required physics for Architecture majors, or if they now need to take calculus physics mechanics for their degree. **Target Date:** Fall 2021.

Potential New Courses

- **ENGR 100** *Introduction to Engineering*, and **ENGR 126** *MATLAB in Science/Engineering*, are 1-unit courses. The C-IDs descriptors for these courses are 2 and 3 units, respectively, and thus do not satisfy C-ID descriptors. Both descriptors are required for the recently authorized Engineering Transfer Certificate.
- Many Introduction to Engineering courses at community colleges are 2 or 3 units, and have a significant hands-on component (e.g., 1-hour lecture, 3-hours lab). Such a 2- or 3-unit course would help motivate and prepare AHC students for their future work.
- MATLAB is also becoming the primary computer language for many engineering majors (in place of traditional programing languages), so increasing the unit count on this course to match the C-ID descriptor will become increasingly important.
- Three AHC classes, ET 100, 140 and 145 are needed for Mechanical Engineering transfers to satisfy a single class which is both on Cal Poly's Transfer Selection Criteria's *Desired* list and a Cal Poly graduation requirement. This is inefficient and students could be better served. ET 100 by itself currently articulates to UCSB's ME10 (Engineering Graphics: Sketching, CAD and Conceptual Design).
- **Planned Action**: Create new courses:
    - An ENGR 101 *Intro to Engineering and Design* (working title). This course could be a 1-unit course to complement ENGR 100, or a 2-unit course that would include ENGR 100 material. The 2-unit experience would match the CI-D descriptor. **Target Date:** Spring 2022.
    - ENGR 127 or 128 *MATLAB and Engineering Problem Solving* (working title) may be proposed to match the relevant C-ID descriptor. **Target Date:** Spring 2022

    OR: ENGR 120 *Introduction to Programming Concepts and Methodologies for Engineers* (4 units, C-ID ENGR 120). **Target Date:** Spring 2022
    - ENGR 142 *Computer Aided Design for Engineers* (working title) would allow a more efficient path for engineering students. This course would be developed in cooperation with Engineering Technology. **Target Date:** Spring 2023
    - ALL three of these courses would allow AHC Engineering program to match all of the courses in at least one of the Engineering Certificate of Transfer paths, created via the Transfer Model Curriculum, C-ID program.

- **Resources**
  - *Time* is needed to develop the three courses, either as reassigned time or a sabbatical. Professional development may be necessary for faculty to develop expertise in computer programs.
  - *Load:* Introducing these courses would increase the Engineering faculty load (potentially by at least 15 hours per year under the present number of offerings). A second full-time faculty member or more part-time faculty will need to be hired.
  - *Licenses*: Up-to-date MATLAB licenses, and Computer Aided Design licenses, will be need to be purchased and maintained. AHC has a Community and Technical College License with MathWorks for MATLAB.
  - *Equipment* and *instructional supplies* to the support the hands-on component of the Introduction to Engineering design class (projects, etc.) will necessitate an increase in the Engineering Program budget.

Grants and Partnerships

The Engineering Program has had a strong history of grants and partnerships that help students grow. AHC Engineering has long promoted various UCSB summer research opportunities (INSET – Internships in Nanoscience, Engineering and Technology; EPSEM-Expanding Pathways to Science, Engineering and Mathematics; PIPELINES -Problem-based Initiatives for Powerful Engagement and Learning In Naval Engineering and Science).

A list of these grants that the Engineering program has been actively involved in is in *Table VIIIa***.**

Prof. Dal Bello has also served on the advisory team of Cañada College's recent NSF-IUSE grant "*Creating Alternative Learning Strategies for Transfer Engineering Programs* (CALSTEP). This was a collaborative project between several community colleges that developed online curriculum for engineering.

Student Learning Outcomes and Other Assessments
Assessments (from SLOs and regular exams, quizzes and homework), point to the conclusion that students need to spend more quality time on their courses outside of class ("time on task"). From the engineering professor's discussions with students, time management is generally cited as the primary cause of sub-par performance, followed by insufficient study strategies. If students can reduce the number of employment hours, and develop better time management and study skills, they can be more successful. The engineering program therefore seeks to support students beyond the classroom by participating in grants and partnerships that provide financial and academic support.

Model Curriculum (MC); C-ID; Certificate of Transfer
An A.S. Transfer Degree (AST), has been discussed for Engineering since SB 1440 was authorized. However, Engineering is a high-unit major and as such an Engineering AST cannot fit into the SB1440 model. In place of a Transfer Model Curriculum, engineering faculty created ***Model Curricula***.

Course Identifier system (C-ID)
The development of C-ID (course identifier) courses has been much more successful than the TMC-development. The content of specific engineering courses is essentially the same throughout the state.

Some challenges exist in that some universities teach certain engineering courses at the sophomore level, while others teach them at the junior level (e.g., *Dynamics*; *Strength of Materials*; *Materials Science*). Fortunately for AHC students, Cal Poly schedules all three in the sophomore year, and UCSB schedules *Dynamics* and *Strengths of Materials* in the sophomore year (*Materials Science* is in the junior year at UCSB).

AHC Engineering Faculty Dom Dal Bello wrote the C-ID descriptor for ENGR 240 *Strength of Materials*.

Engineering Certificate of Transfer
An Engineering transfer certificate has been approved via the C-ID system for at least four tracks: (1) Mechanical, Aerospace, and Manufacturing; (2) Civil; (3) Electrical; (4) Computer and Software. AHC does not have C-ID articulation for several courses: so AHC is currently unable to match the transfer certificate requirements. Missing courses include:

- All Tracks: *Introduction to Engineering* (2 units, C-ID ENGR 110) - All Tracks
- (2) Civil Track: *Surveying* (3 units, C-ID ENGR 180) – Civil Track;
  Note: *Circuits* is an acceptable alternative to *Surveying* in the Civil Engineering Certificate
- (1) Mechanical and (2) Civil Tracks: *Statics* (3 units, C-ID ENGR 130)
- (1) Mechanical and (2) Civil Tracks: *Programing and Problem Solving in MATLAB* (3 units, C-ID ENGR 220) *OR* *Introduction to Programming Concepts and Methodologies for Engineers* (4 units, C-ID ENGR 120).
- (3) Electrical and (4) Computer Tracks: *Introduction to Programming Concepts and Methodologies for Engineers* (4 units, C-ID ENGR 120).

This points towards

1. redesigning or adding and additional courses in parallel with AHC's current ENGR 100 (*Intro*).
2. Eliminating AHC PHYS 141 as a pre-requisite to ENGR 152 *Statics*
3. Developing and equivalent course to C-ID ENGR 120, which generally will have C++ or MATLAB.

UC's taking Community College courses as upper-division credit
At the Fall 2016 Engineering Liaison Council meeting in UCI, it was announced that UC's would be allowed, if not encouraged, to accept coursework taught at a community college for upper division coursework at the university. Feedback from some transfers has already indicated that they received both content and upper division unit credit (!) for taking Engr. 161 (Materials Science). UC Riverside and UCLA have done so for AHC engineering courses. This may help more students in their transfer process.

Changes in Pre-requisites to Engr 170/171 Electric Circuit Analysis
It was noted in previous program reviews and annual updates that the physics pre-requisite for Engr. 170/171 Electric Circuits should be changed from Physics 161 (mechanics) to Physics 163 (Electricity and Magnetism). Physics E&M is the standard pre-requisite.

The change took officially took effect in Fall 2016.

To make scheduling better for Engineering majors:

- In Fall 2014, Physics 163 switched from Spring to Fall, and Physics 162 to Spring.
- In Fall 2015, the Engr 161/2 Engr. 161/2 was switched to Fall, Engr. 170/1 to Spring.
- Engineers now take Physics 163 in Fall, and Engr 170/171 in Spring, right before transfer.

The effect of moving Engr. 170/171 to Spring and Engr 161/161 to Fall is as follows:

1. When Engr. 161/162 was offered in the Spring, many students had met its pre-requisite to take it by spring semester before their last year at AHC. Thus, a student could have the following schedule 3-semester sequence:

    - Spring 2011: Engr. 161/2; Fall 2011: Engr. 152 and 170/171; Spring 2012, Engr. 154 and 156

   With the new format, a student taking all classes in "typical sequence" will have a shortened 2-semester sequence:

    - Fall 2016: Engr. Engr. 152 and 161/162 ; Spring 2017: Engr. 154, 156, and 170/171.

2. Engr. 170/171, Engr. 154 and Engr. 156 are now all in spring. They are considered the most difficult of the five AHC Engineering courses. All need to be taken by Mechanical Engineers (the largest engineering major at AHC). Since Engr. 154 and Engr. 156 are less necessary than circuits to be transfer competitive, <u>enrollment in Engr. 154 and/or Engr. 156 may be adversely affected</u>.
3. Engr. 172/173 (Circuits 2) needed to be deactivated. It could not fit into a realistic pathway:
    - AHC was the only community college (to my knowledge) that offered this course. Engr. 172/173 articulated to both UCSB and Cal Poly. The neighboring universities seemed to have been the only universities to offer this course in the sophomore year, so AHC has been in a good position to offer it. About 2017, UCSB changed its Electrical Engineering curriculum and no longer articulates any EE courses with community colleges.
    - More importantly, only Electrical Engineers and Computer Engineers need the course, and historical enrollments has been low (usually single-digits). Engr. 172/3 has not been offered since Spring 2007, so it was on the "sunset list" regardless.
    - Deactivated as of Fall 2018 (per CurriQunet).

Table VIIIa. Engineering Program Grants where AHC Received Funds, Either Directly from Granting Institution or a Sub-awardee.

Start Date, Duration	Program	P.I.	Project Title	Lead/ Partners	Amount to AHC	Remark
2007–2010	NSF CCLI	P.I.: Al Liddicoat, Cal Poly SLO AHC Co-P.I.: Dom Dal Bello	Enhancing Student Learning Through State-of-the-Art Systems Level Design and Implementation	Cal Poly (lead), AHC	~$40,000	• Development of printed circuit board design project for lower division circuit courses.
2007–2010	HP Grant	P.I.: Dom Dal Bello (AHC only)	***ICE***: Interactive Classroom Environment	AHC only	~$80,000 (goods and $)	• 20 tablet PCs, large scale printer and funds to developed ICE
S2012–S2018	NSF S-STEM	P.I.: Dom Dal Bello (AHC only)	***SESMC***: Scholarships in Engineering Science, Mathematics and Computer Science	AHC only	$600,000	• Scholarship and mentoring grant program for economically challenged, academically talented STEM students. • All STEM majors • $520,000 in scholarships
9/01/2016 –present 60 months	NSF S-STEM	Subawardee to Cal Poly AHC Co-P.I.: Dom Dal Bello	***ESTEEM***: Enhancing Success in Transfer Education for Engineering Majors	UCSB (lead, Susannah Scott) AHC, SBCC, Oxnard, Ventura	$500,000 Annual Contracts of $100k July1-June30	• Scholarships/Mentoring/ Student Support • Engineering and Comp Sci. majors • At least $375,000 in scholarships
09/01/2018 –present 48 months	NSF IUSE	PI: Dom Dal Bello NSF# 1834154 AHC has its own award with NSF in collaboration with four other institutions	Collaborative Research: Understanding Context: Propagation and Effectiveness of the Concept Warehouse in Mechanical Engineering at Five Diverse Institutions and Beyond	Cal Poly (lead, Brian Self), AHC, Bucknell, Oregon State, Univ. of Puerto Rico	$72,560	• Improving student conceptual understanding • Project with various universities • AHC to coordinate community college participants
09/01/2018 –present 30 months	NSF LSAMP	PI: Dom Dal Bello. NSF# 1817508	LSAMP Pre-Alliance Planning: ***C6***: California Central Coast Community College Collaborative	AHC (lead), Cabrillo, Cuesta, Monterrey Peninsula, Moorpark, Oxnard, SBCC, Ventura	$124,777	• Planning grant for Bridges to the Baccalaureate LSAMP grant • Partnering with other CCCs
10/01/2018 –present 60 months	NSF S-STEM	PI: Dom Dal Bello, NSF# 1821603 AHC has its own award. Collaboration with CPSLO, Cuesta	ENGAGE: Engineering Neighbors: Gaining Access, Growing Engineers	Cal Poly (lead, Jane Lehr), AHC, Cuesta	$1,232,322	• Dom suggested the name ENGAGE. • Scholarships/Mentoring/ Student Support • Engineering and Comp Sci. majors • At least $770,000 in scholarships
07/01/2019 –present 36 months	CELL	Subawardee to Cal Poly AHC PI: Dom Dal Bello	The Mechanics of Inclusion and Inclusivity in Mechanics	Cal Poly (lead, Brian Self), AHC, UCSB	$203,000	• Work with Physics and (Mechanical) Engineering Programs at AHC and Cal Poly to develop inclusive learning environment and online tools
				TOTAL	**$2,852,749**	• **At least $1,665,000 in scholarships**

NSF National Science Foundation. NSF CCLI: Course, Curriculum and Laboratory Improvement Grant. **HP Grant**: Hewlett-Packard Technology for Teaching Grant.
NSF S-STEM: National Science Foundation Scholarships in Science, Technology, Engineering and Mathematics. **NSF IUSE**: Improving Undergraduate STEM Education.
CELL: California Education Learning Lab grant (Governor's Office of Planning and Research).

STUDENT DATA SUMMARY

Data analysis is a critical component of program review. The three categories below should be used as guidelines in developing a summary of the student data.

49 students took the survey in Fall 2020
43% of the respondents were from Engr 100 (Intro to Engineering), and most of those are primarily first-year students. The balance are "sophomore level" students, many of whom should be transferring.

Alumni Survey
A total of 149 AHC Engineering Alumni from 2002-03 through 2014-2015 responded to a survey emailed to 300 emails. Key numerical results of this survey are summarized here and details included in the appendix, as well as responses to open ended questions (e.g., Advice for future students).

State at least three positive factors about the discipline/program identified by students. Include the number (or percentage) of students responding and any implications for planning.

- 22/49 (45%) were *Highly Satisfied* with the "Quality of Instruction within the program."
  44/49 (90%) were *Highly Satisfied* or *Somewhat Satisfied*.

- 29/49 (59%) were *Highly Satisfied* with the "The way this program meets your educational goals."
  46/49 (92%) were *Highly Satisfied* or *Somewhat Satisfied*.

- 25/48 (52%) were *Highly Satisfied* with the "Content of courses in the Engineering Program."
  44/48 (92%) were *Highly Satisfied* or *Somewhat Satisfied*.

- 23/47 (49%) were *Highly Satisfied* with the "Advice about the program from Counselors"
  39/47 (83%) were *Highly Satisfied* or *Somewhat Satisfied*.

Although the results are nice to see, it would be better if answers were more skewed towards Highly Satisfied. This was the first semester that engineering courses were taught entirely online, so the ability to provide quality instruction and content without being face-to-face was a challenge.

Most students in engineering courses are transfer-bound, so the *Highly Satisfied* score of 59% for *educational goals* is not a surprise.

The Counselor question received more positive response than in the past. The counselors have done a great job in connecting with students during COVID. The STEM counselors have been doing a lot of outreach to incoming freshman during Week of Discovery, and reaching out to students having a difficult time. Such activities should continue.

Alumni Survey

- 119/149 (80%) were *Highly Satisfied* with the "Quality of instruction within the program."
  143/149 (96%) were *Highly Satisfied* or *Somewhat Satisfied*.

- 118/149 (79%) were *Highly Satisfied* with the "Contribution towards your intellectual growth."
  142/149 (95%) were *Highly Satisfied* or *Somewhat Satisfied*.

- 109/148 (74%) were *Highly Satisfied* with "The content of courses offered in the program."
  144/148 (92%) were *Highly Satisfied* or *Somewhat Satisfied*.

- 108/149 (72%) were *Highly Satisfied* with the "The way this program met your educational needs."
  144/149 (97%) were *Highly Satisfied* or *Somewhat Satisfied*.

147/149 (99%) *Strongly Agreed/Agreed* that they would "Recommend taking course in the Engineering Program at Allan Hancock College."

State at least three negative factors about the discipline/program identified by students. Include the number (or percentage) of students responding and any implications for planning.

The lowest scoring items:

- 28/38 (73%) were *Highly Satisfied* or *Somewhat Satisfied* with "physical facilities and space."
  10/38 (27%) were *Neither Satisfied/dissatisfied, Somewhat Dissatisfied,* or *Highly Dissatisfied*.

- 30/41 (74%) were *Highly Satisfied* or *Somewhat Satisfied* with "Course assistance through tutorial services."
  11/41 (26%) were *Neither Satisfied/Dissatisfied. Somewhat Dissatisfied,* or *Highly Dissatisfied*.

- 26/38 (69%) were *Highly Satisfied* or *Satisfied* with "availability of appropriate resources in the libraries."
- 12/38 (31%) were *Neither Satisfied/Dissatisfied. Somewhat Dissatisfied,* or *Highly Dissatisfied*.

The survey was taken during COVID. Visiting the physical facilities and tutorial services has been more difficult for students in ERT mode, so unfortunately, these are not a surprise. The library has hardcopies of all the engineering text books, but not necessarily electronic versions. MESA and STEM also have reference hardcopies of the engineering text books that the students can use in the MESA and STEM Centers. It should be noted that MESA maintains a lending library, which with Student Success funds, has enough books for two ENGR 100 sections, and one ENGR 152 Statics section.

Alumni Survey

- 69/149 (46%) were *Highly Satisfied* with the "Advice about the program from Counselors"
  114/149 (77%) were *Highly Satisfied* or *Somewhat Satisfied*.

- 75/149 (50%) were *Highly Satisfied* with the "Advice about the program from Counselors"
  121/149 (81%) were *Highly Satisfied* or *Somewhat Satisfied*.

- 76/149 (51%) were *Highly Satisfied* with the "Advice about the program from Counselors"

126/149 (85%) were *Highly Satisfied* or *Somewhat Satisfied*.

State any other information (use responsive numbers) that you obtained from student data (e.g. focus groups, questionnaires, or SGIDs) that may be of special interest to the self-study team. What planning implications will result from this information?

- N/A

STUDENT DATA COLLECTION

Current Student Survey – Fall 2020

Please answer the following questions as they pertain to your experience in this course and all other courses in Engineering Program at Allan Hancock College.

Part I. Please indicate how satisfied you are, in general, with the following aspects of the Engineering Program.

		Highly Satisfied	Moderately Satisfied	Neither satisfied nor dissatisfied	Somewhat dissatisfied	Highly Dissatisfied	No Opinion
1.	Quality of instruction within the program	☐	☐	☐	☐	☐	☐
2.	The way textbooks and other materials used in courses within the program help me learn	☐	☐	☐	☐	☐	☐
3.	Advice about the program from counselors	☐	☐	☐	☐	☐	☐
4.	The way this program meets your educational goals	☐	☐	☐	☐	☐	☐
5.	Contribution towards your intellectual growth	☐	☐	☐	☐	☐	☐
6.	Clarity of course goals and learning objectives	☐	☐	☐	☐	☐	☐
7.	Feedback and assessment of progress towards learning objectives	☐	☐	☐	☐	☐	☐
8.	The availability of courses offered in the program	☐	☐	☐	☐	☐	☐
9.	The content of courses offered in the Engineering Program.	☐	☐	☐	☐	☐	☐
10.	The coordination of courses offered in the Engineering Program and courses offered in other departments that may be required for your major.	☐	☐	☐	☐	☐	☐
11.	The physical facilities and space (e.g., classrooms, labs).	☐	☐	☐	☐	☐	☐
12.	Instructional equipment (e.g., computers, lab equipment).	☐	☐	☐	☐	☐	☐
13.	Presentation of classes via the college's Blackboard course management system.	☐	☐	☐	☐	☐	☐
14.	Course assistance through tutorial services (e.g., through the Tutorial Center, Math Lab, Writing Center).	☐	☐	☐	☐	☐	☐
15.	Availability of appropriate resources in the libraries.	☐	☐	☐	☐	☐	☐

Part II Please answer the following questions about the Engineering Program.

16. What is your major?

☐ Mechanical Engineering	☐ Aerospace, General, Industrial, Manufacturing or Materials Engineering	☐ Electrical or Computer Engineering
☐ Civil, Architectural or Environmental Engineering	☐ Chemical or Biomedical Engineering	☐ Other _______________

17. Where do you intend to transfer?

☐ Cal Poly San Luis Obispo	☐ UC Santa Barbara	☐ Another Cal State University (not Cal Poly)
☐ Another University of California (not UCSB)	☐ A private or out-of-state university	☐ I do not intend to transfer

18. On Average, how many hour per week are you working? (round to the closest answer)

☐ 0	☐ 10	☐ 20
☐ 30	☐ 40+	

19. In which of the following courses are you currently enrolled?

☐ ENGR 100 – Intro to Engineering	☐ ENGR 152 - Statics	☐ ENGR 161/162 Materials Science (lecture/lab)
☐ Not currently in any Engineering Courses		

20. Which of the following courses have you taken in the **engineering program**?

☐ ENGR 100 – Intro to Engineering	☐ ENGR 124 – Excel in Science/Engineering	☐ ENGR 126 – Matlab in Science/Engineering
☐ ENGR 152 - Statics	☐ ENGR 152 – Dynamics	☐ ENGR 156 – Strength of Materials
☐ ENGR 161/162 Materials Science (lecture/lab)	☐ ENGR 170/171 Basic Circuits (lecture/lab)	

21. Which of the following courses do you plan on taking in the **engineering program**?

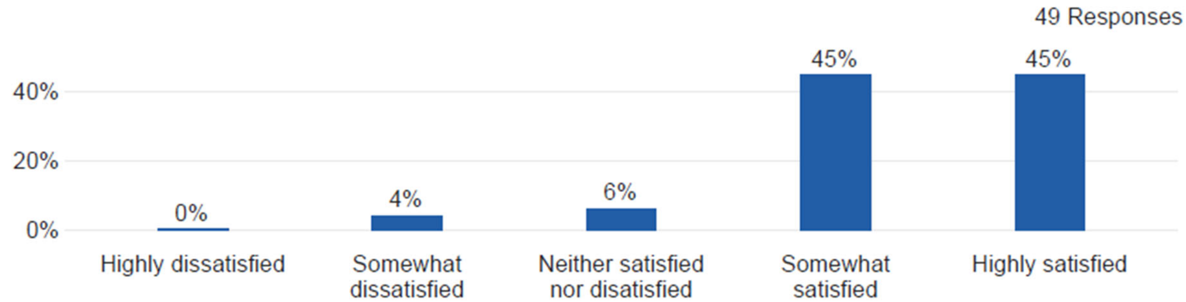
☐ ENGR 100 – Intro to Engineering	☐ ENGR 124 – Excel in Science/Engineering	☐ ENGR 126 – Matlab in Science/Engineering
☐ ENGR 152 - Statics	☐ ENGR 152 – Dynamics	☐ ENGR 156 – Strength of Materials
☐ ENGR 161/162 Materials Science (lecture/lab)	☐ ENGR 170/171 Basic Circuits (lecture/lab)	

22. I feel I am being well prepared to succeed academically at a 4-year university	Strongly Agree	☐ ☐ ☐ ☐ ☐	Strong Disagree
23. I would recommend taking courses in the engineering program at Allan Hancock College	Strongly Agree	☐ ☐ ☐ ☐ ☐	Strong Disagree

Engineering Program
Fall 2020
Total = 49

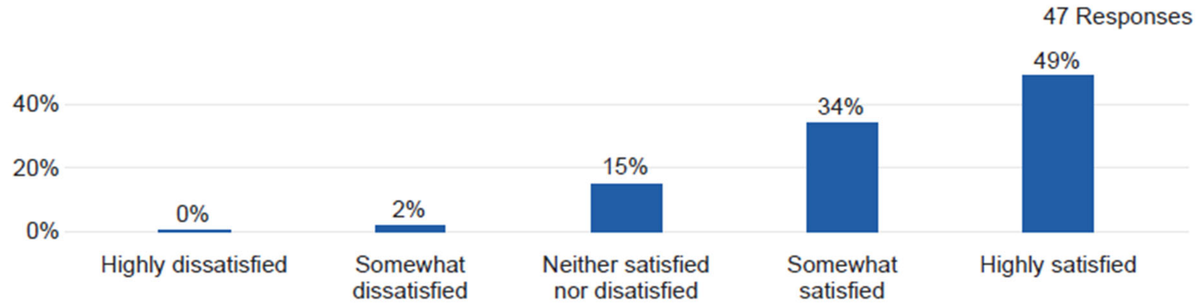
Part I. Please indicate how satisfied you are, in general, with the following aspects of the Engineering program.

Q2_1 - Quality of instruction within the program

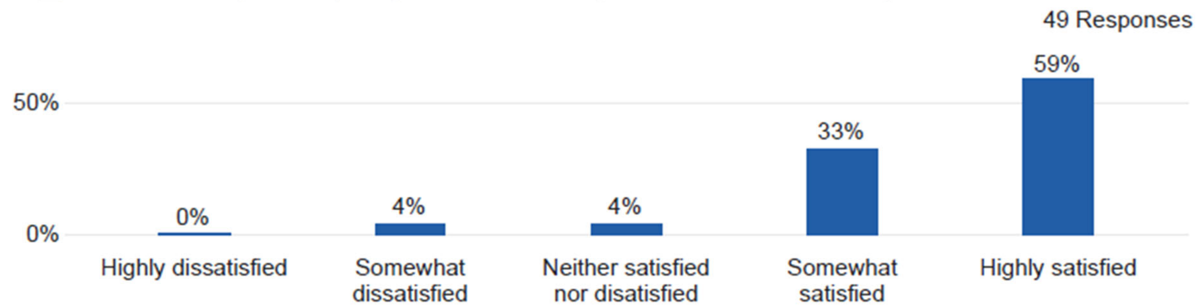


Q2_2 - The way textbooks and other materials used in courses within the program help me learn

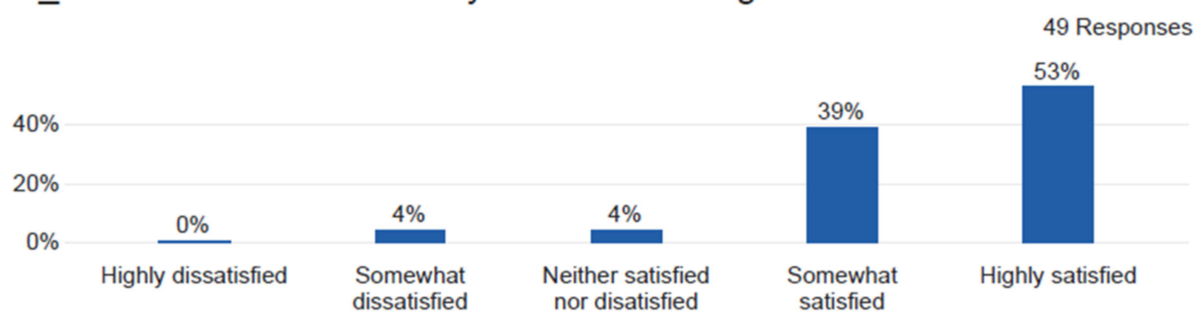
Q2_3 - Advice about the program from counselors



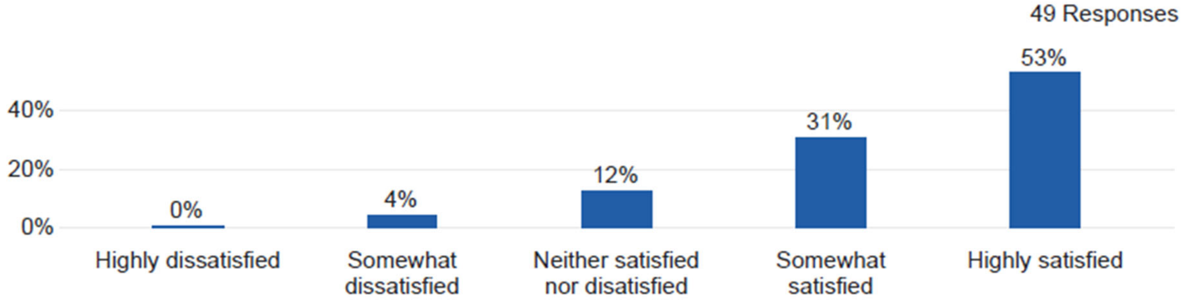
Q2_4 - The way this program meets your educational goals



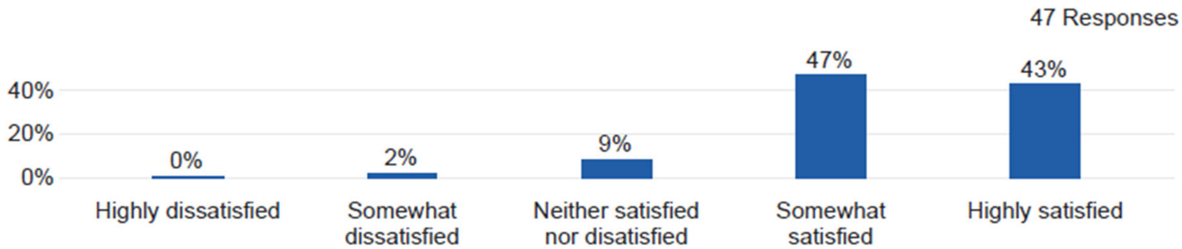
Q2_5 - Contribution towards your intellectual growth



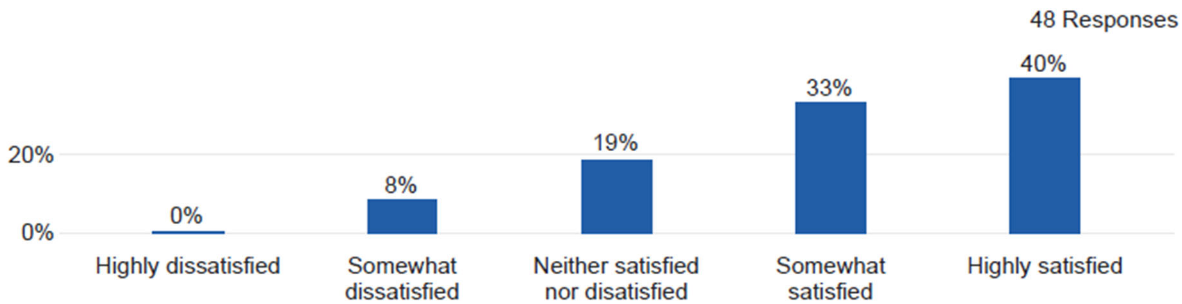
Q2_6 - Clarity of course goals and learning objectives



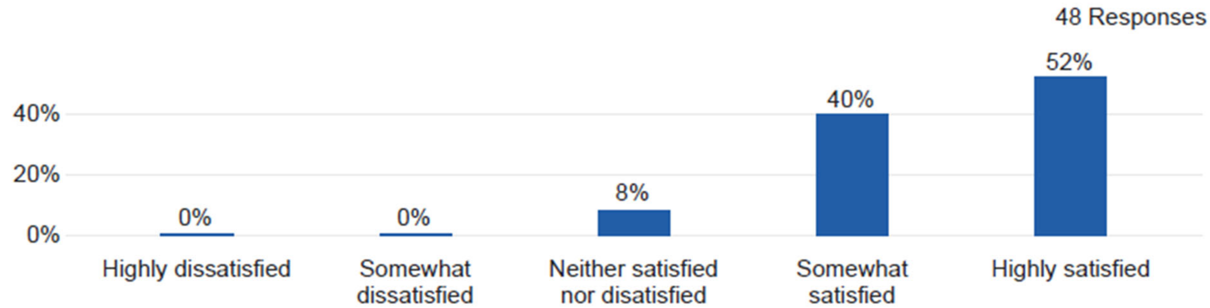
Q2_7 - Feedback and assessment of progress towards learning objectives



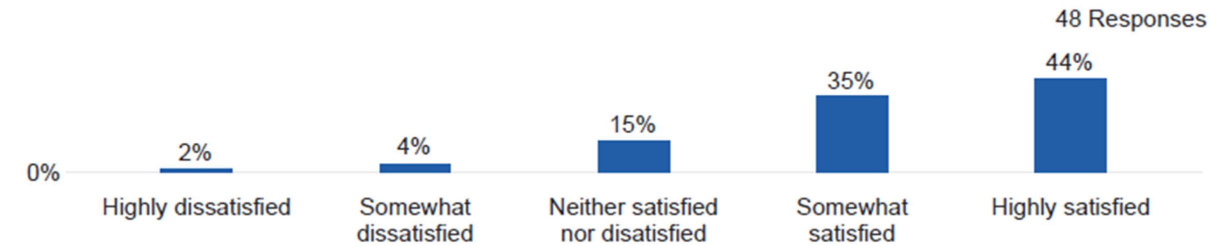
Q2_8 - The availability of courses offered in the Engineering program



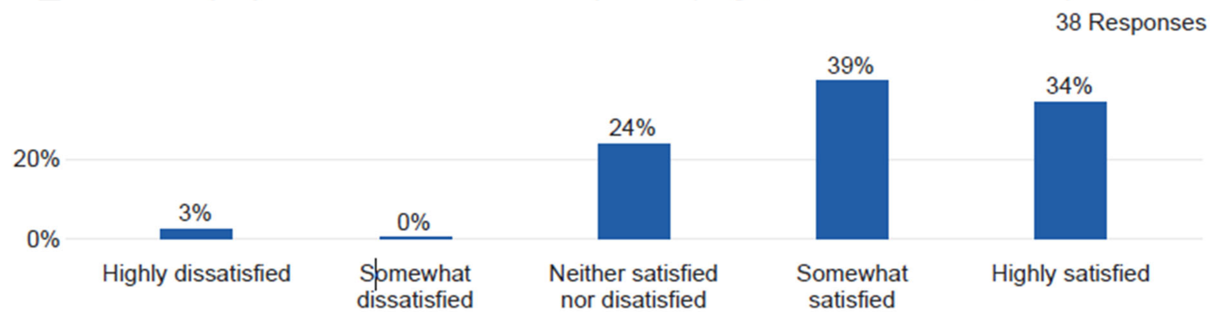
Q2_9 - The content of courses offered in the Engineering program



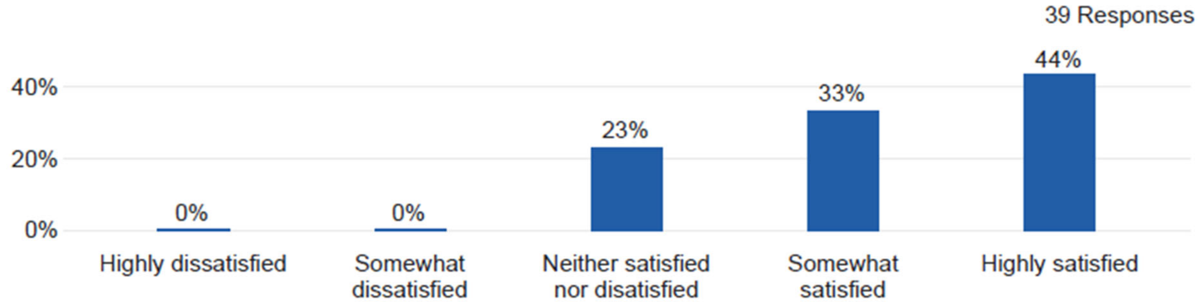
Q2_10 - The coordination of courses offered in the Engineering program and courses offered in other departments that may be required for your major



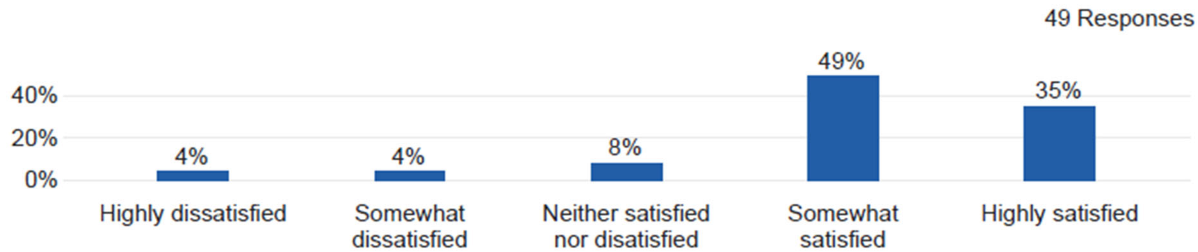
Q2_11 - The physical facilities and space (e.g., classrooms, labs)



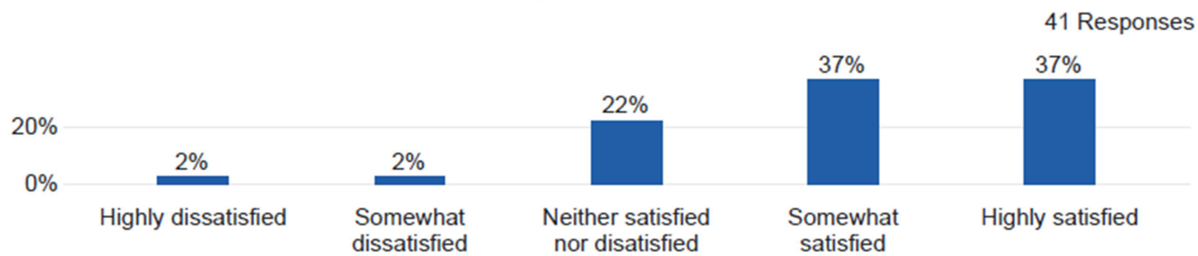
Q2_12 - Instructional equipment (e.g., computers, lab equipment)



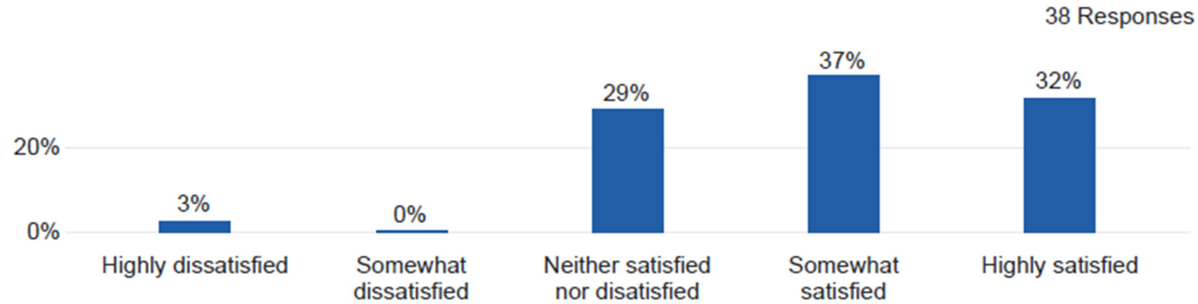
Q2_13 - Presentation of classes via the college's Canvas course management system



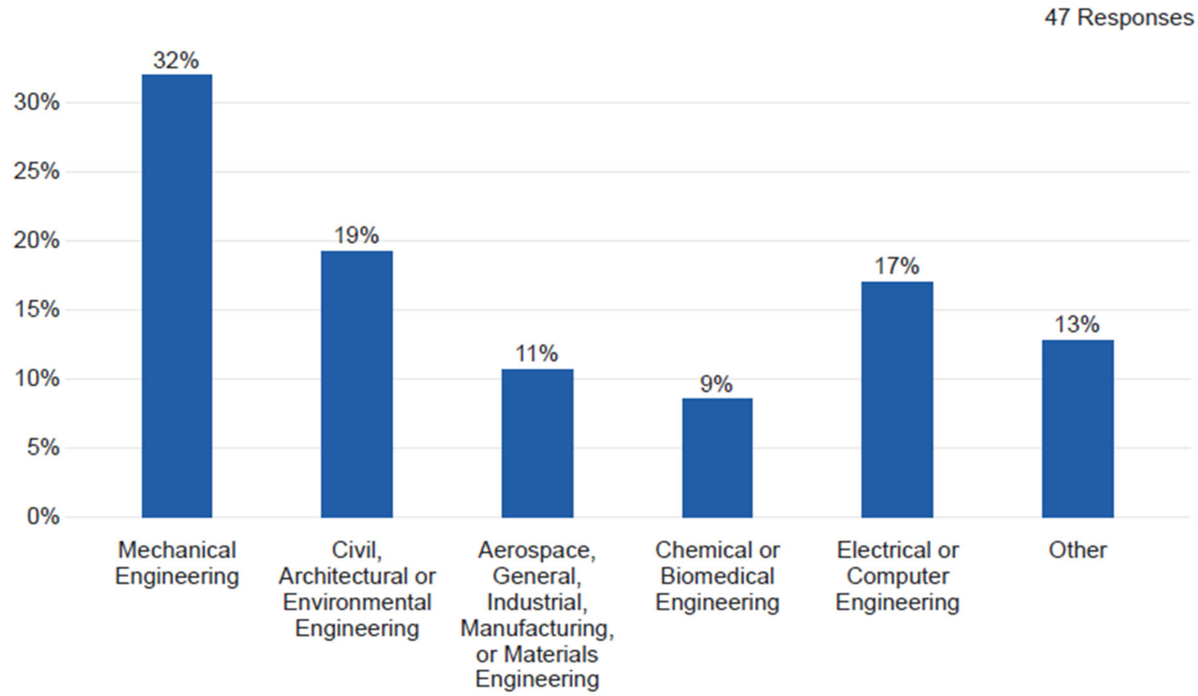
Q2_14 - Course assistance through tutorial services (e.g through the Tutorial Center, Math Lab, Writing Center)



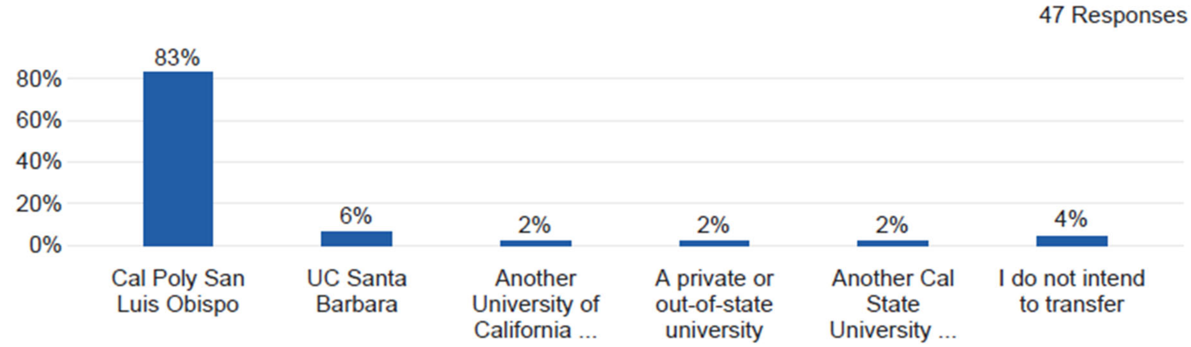
Q2_15 - Availability of appropriate resources in the libraries



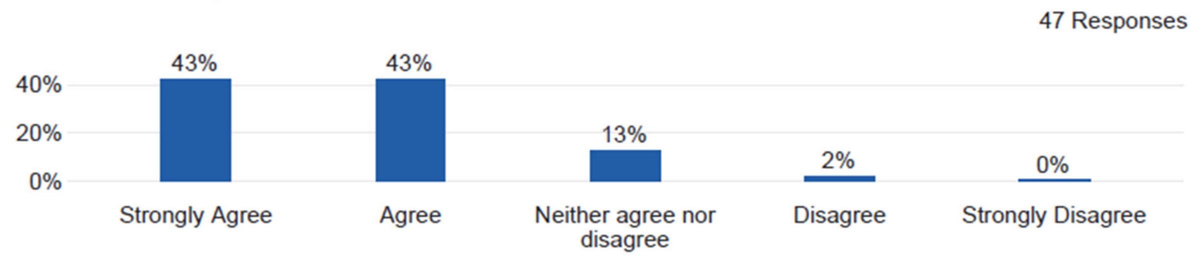
Q4 - Which of the following best describes your reason for taking this and other courses in the Engineering program? - Selected Choice



Q5 - Compared to the beginning of the semester, your attitude about the Engineering program has

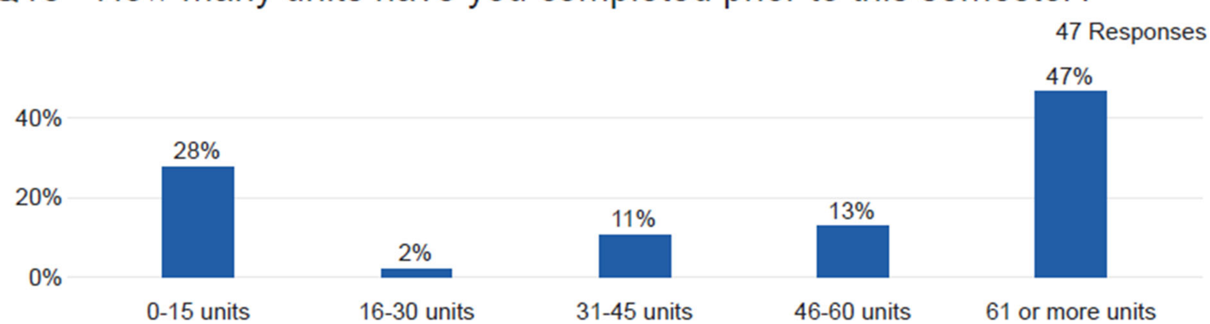


Q6_1 - I feel I am being well-prepared to succeed academically at a 4-year university.

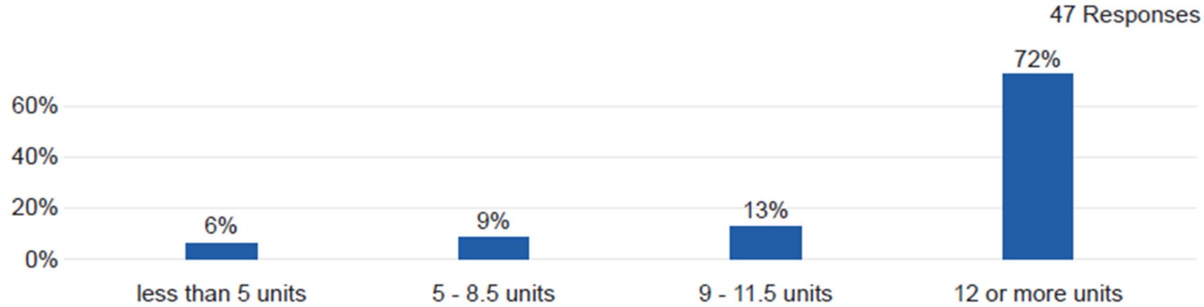


Q6_2 - I would recommend taking course in the engineering program at Allan Hancock College.

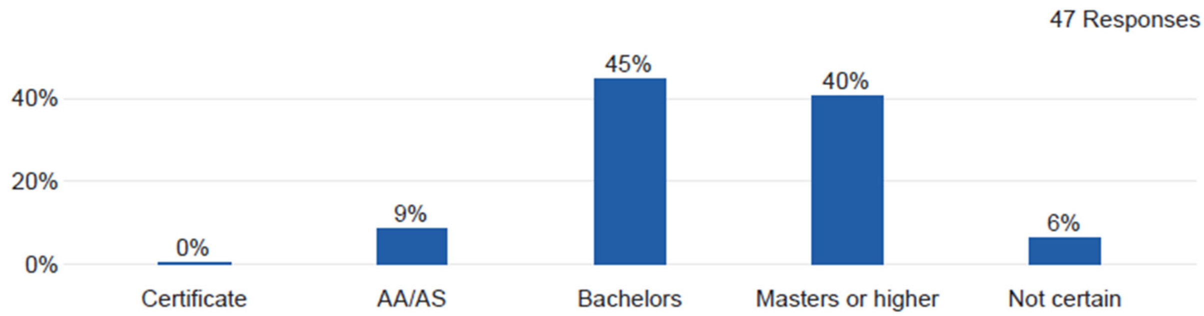
Q10 - How many units have you completed prior to this semester?



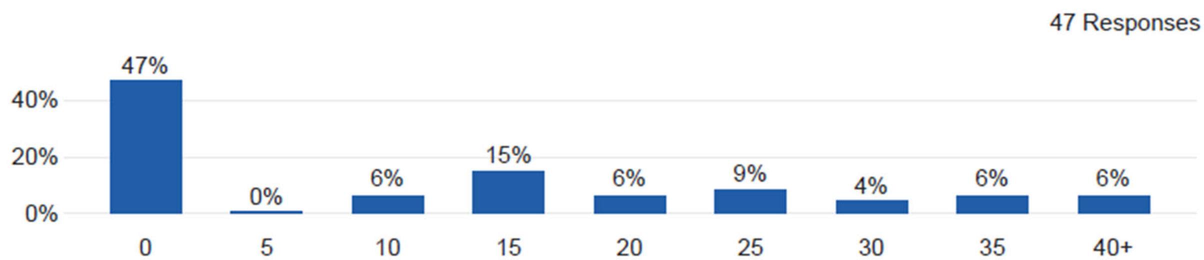
Q11 - In how many units are you currently enrolled?



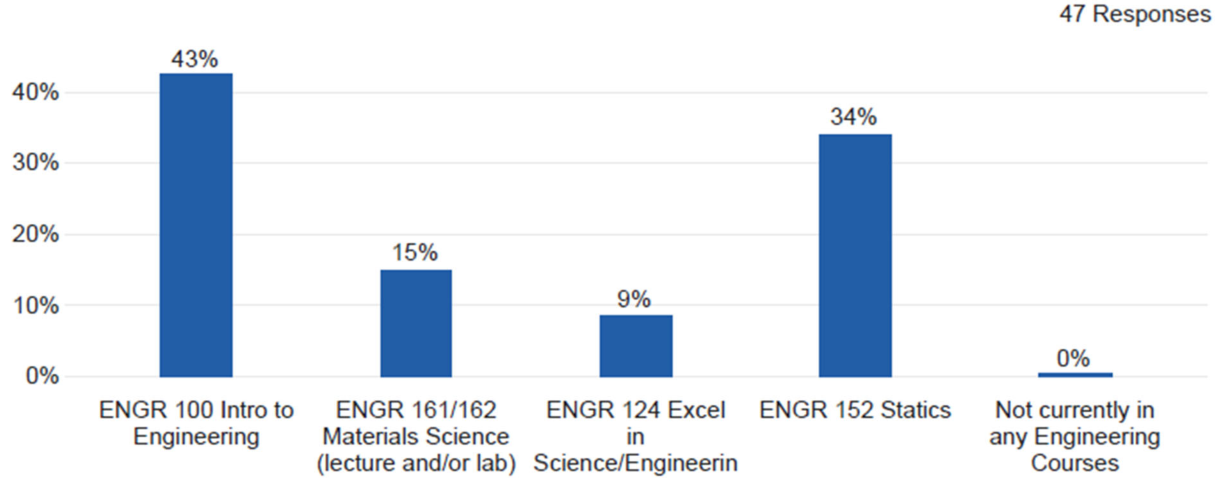
Q12 - What is your final academic goal?



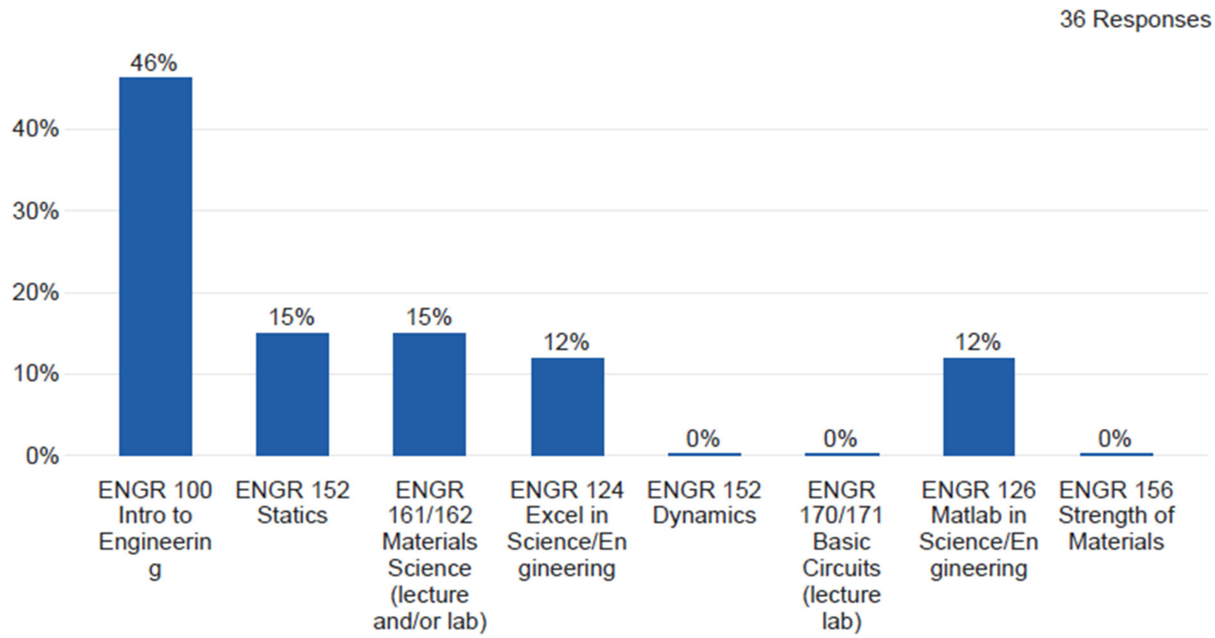
Q13 - On average, how many hours per week are you working? (round to the closest answer)



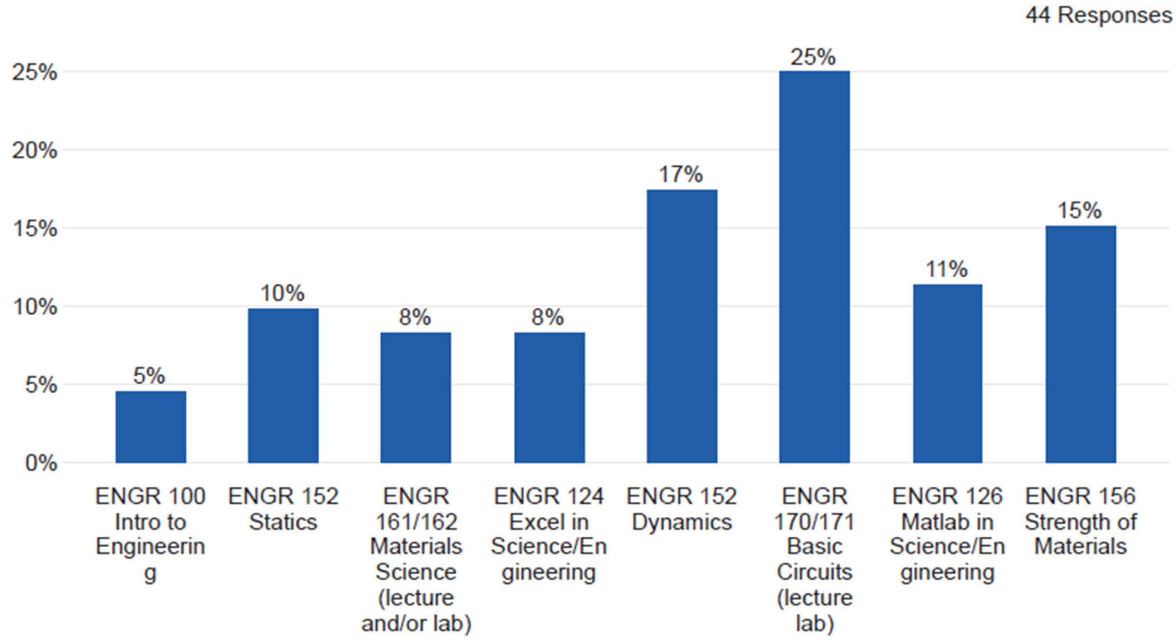
Q14 - In which of the following course are you currently enrolled?



Q15 - Which of the following course have you taken in the engineering program?



Q16 - Which of the following course do you plan on taking in the engineering program?



Assessment Plan

This part of the program review demonstrates alignment of courses with coverage of program student learning outcomes and lays out the program's plans for conducting assessments over the forthcoming five years.

Mission

The educational mission of the **AHC Engineering Program** is as follows:

1. To prepare students to transfer to, and succeed at, a four-year undergraduate engineering program.
2. To provide courses that enable students to complete lower division engineering requirements for transfer to a four-year university, and/or to complete an Associate Degree in Engineering.

The program seeks to produce transfer-ready students who are technically competent in sophomore-level engineering subjects, who can communicate and work effectively in diverse teams, and who are responsible citizens. The program also seeks to promote student interaction with faculty, industry, student organizations and professional societies.

Program Outcomes

The Program Student Learning Outcomes are as follows:

PSLO 1: Apply fundamental concepts of mathematics (through calculus), science and engineering.
PSLO 2: Identify, formulate, and solve basic engineering problems.
PSLO 3: Conduct experiments and analyze and interpret data.
PSLO 4: Make basic design decisions concerning appropriate-level engineering problems.
PSLO 5: Communicate effectively both orally and in writing, using symbols, graphics and numbers.
PSLO 6: Recognize the need for, and an ability to engage in, lifelong learning.
PSLO 7: Function professionally and ethically as an individual and within diverse teams.
PSLO 8: Use techniques, skills and modern engineering tools necessary in engineering education and practice.

The PSLO are modelled after those that the four-year Engineering Programs follow, i.e., the Accreditation Board for Engineering and Technology (ABET) Engineering Criterion 3, Outcomes 1-7, in addition to the outcomes for AHC in general.

All CSLOs, PSLOs and ISLOs have been linked. See "ISLO/PSLO Summary Map by Course":

Course/Program Alignment

Outcomes will be introduced, developed and practiced with feedback, and demonstrated at their highest levels as shown below. Outcomes 1 and 2 are assessed with an exam. This exam is given in P390/391. Outcome 2 is also assessed with alumni feedback obtained via survey. Outcome 3 is assessed in P390/391 using a rubric. Outcome 4 is assessed using a practicum exam at the end of the lab associated with P240. Outcome 5 is assessed for participating students by successful completion of research programs, and any resulting conference presentations, honors theses, and published paper. (Key: I= Introduced, D=Developed and practiced with feedback; M=Demonstrated at a specified mastery level)

COURSE	**ENGINEERING OUTCOMES – OUTCOMES** (Key: I= Introduced, D=Developed and practiced with feedback; M=Demonstrated at a specified mastery level)							
ENGR	**PSLO 1**	**PSLO 2:**	**PSLO 3**	**PSLO 4**	**PSLO 5**	**PSLO 6**	**PSLO 7**	**PSLO 8:**
	Apply fundamental concepts of mathematics (through calculus), science and engineering.	Identify, formulate, and solve basic engineering problems.	Conduct experiments and analyze and interpret data.	Make basic design decisions concerning appropriate-level engineering problems.	Communicate effectively both orally and in writing, using symbols, graphics and numbers.	Recognize the need for, and an ability to engage in, lifelong learning.	Function professionally and ethically as an individual and within diverse teams.	Use techniques, skills and modern engineering tools necessary in engineering education and practice.
100				I	D	D	D	D
124	D				D	D	D	D
126	D				D	D	D	D
152	M	M			M	D	D	M
154	M	M			M	D	D	M
156	M	M		D	M	D	D	M
161	M	M			M	D	D	M
162	M	D	D, M		M	D	D	M
170	M	M		D	M	D	D	M
171	M	D	D, M		M	D	D	M

Implementation of Assessment

Responsibility for implementing the assessment lies with the entire department. Confident that outcomes are reflected in actual coursework of your major/program, describe the mechanisms for assessment. Think of assessing your outcomes on a 4 or 5 year cycle. (If you have 10 outcomes assessing 2 a year is ideal.)

Assessment Cycle

Use one row for each Program outcome. *Your 6-Year assessment schedule can be inserted here, if you've already completed it.*

Program Outcome	To be assessed in semester:	Assessment method(s)	Team to review assessment results	Resources needed to conduct assessment	Individual responsible for assessment report	Date we expect to complete review
PLO 1	F21	Exams	Engr. Faculty	n/.a	Engr. Faculty	S22
PLO 2	S22	Homework, Exams	Engr. Faculty	n/a	Engr. Faculty	F22
PLO 3	F22, S23	Lab Experiments and Reports	Engr. Faculty	Lab Equipment	Engr. Faculty	S23, F23
PLO 4	S23	Projects, Homework	Engr. Faculty	Project Materials	Engr. Faculty	F23
PLO 5	F23	Homework	Engr. Faculty	Computer with STEM Software	Engr. Faculty	S24
PLO 6	S24	Homework, Discussions	Engr. Faculty	n/a	Engr. Faculty	F24
PLO 7	F22, F24	Projects, Lab Assignments	Engr. Faculty	n/a	Engr. Faculty	S23, S25
PLO 8	S25	Project, Homework, Lab Experiment and Practicum	Engr. Faculty	Computers or software (Excel, MATLAB, simulations), Lab Equipment.	Engr. Faculty	F25

Dissemination of Information

Results will be shared in a special department meeting once a year. This will occur near the end of the academic year as soon as exam data for the year are available. In addition, written summaries will be shared with the Learning Outcomes and Assessment Committee, the Dean, and the Vice President, Academic Affairs.

2020 REVIEW OF PREREQUISITES, COREQUISITES, AND ADVISORIES

Summary

List all courses in Discipline/Program

Course Prefix No	**CURRENT** Prerequisite/Coreq/Advisory/ Limitation on Enrollment	**LEVEL OF SCRUTINY** (Statistics, Content Review, UC/CSU Comparison, Student Survey – list all)	**RESULT** (i.e., current PCA is established, should be dropped/modified or new PCA is established)	**ACTION TO BE TAKEN** (None, APP- Major or Minor)
ENGR 100	1. Advs: Engl 514 or Eligibility for Engl 101	UC/CSU Comparison, Content Review	1. current PCA is established	1. None
ENGR 124	1. Pre-req.: Math 181	Content Review	1. possibly modify: Pre-req to Coreq	1. APP - Major ???
ENGR 126	1. Pre-req.: Math 181	UC/CSU Comparison, Content Review	1. current PCA is established	1. None
ENGR 152	1. Pre-req.: Math 182 2. Pre-req.: Physics 161 or 141	UC/CSU Comparison, C-ID Comparison	1. current PCA is established 2. current PCA is established, but catalog may be confusing "Math 182 and Phys 161 or Phys 141"	1. None 2. None; consider change to "Math 182 and (Phys 161 or Phys 141)" APP-Minor?
ENGR 154	1. Pre-req.: Engr. 152 2. Pre-req.: Math 182	UC/CSU Comparison, C-ID Comparison	1. current PCA is established 2. consider modification to Math 183 (**concurrent**), or elimination?	1. None 2. APP - Major
ENGR 156	1. Pre-req.: Engr. 152	UC/CSU Comparison, C-ID Comparison	1. current PCA is established	1. None 2. APP - Major
ENGR 161	1. Pre-req.: Physics 161 2. Pre-req.: Chemistry 150 3. Advis.: Conc: Engr. 162	UC/CSU Comparison, C-ID Comparison	1. current PCA is established 2. current PCA is established 3. current PCA is established	1. None 2. None 3. None
ENGR 162	1. Pre-req.: Physics 161 2. Pre-req.: Chemistry 150 3. Co-req.: Engr. 161, or prior completion	UC/CSU Comparison, C-ID Comparison	1. current PCA is established 2. current PCA is established 3. current PCA is established	1. None 2. None 3. None
ENGR 170	1. Pre-req.: Math 184 2. Pre-req.: Physics 163 3. Advis.: Conc: Engr. 171	UC/CSU Comparison, C-ID Comparison	1. modify to Math 184/**concurrent** 2. current PCA is established 3. current PCA is established	1. APP - Major, in progress 2. None 3. None
ENGR 171	1. Pre-req.: Math 184 2. Pre-req.: Physics 163 3. Co-req.: Engr. 170, or prior completion	UC/CSU Comparison C-ID Comparison	1. modify to Math 184/**concurrent** 2. current PCA is established 3. current PCA is established	1. APP - Major, in progress 2. None 3. None
The following courses have recently been deactivated.				
ENGR 172	1. Pre-req.: Engr. 170 2. Pre-req.: Engr. 171 3. Co-reg.: Engr. 173	UC/CSU Comparison	1. current PCA is established 2. current PCA is established 3. current PCA is established	1. None 2. None 3. None
ENGR 173	1. Pre-req.: Engr. 170 2. Pre-req.: Engr. 171	UC/CSU Comparison	1. current PCA is established 2. current PCA is established	1. None 2. None

	3. Co-req.: Engr. 172		3. current PCA is established	3. None

Note: If prerequisite or corequisite is being established for the first time, course must be modified to include entrance skills.

Completed forms and all backup documentation should be maintained at the department. This summary report should be included in the self-study report to be conducted during the next academic year.

PLAN OF ACTION - PRE-VALIDATION Six Year

DEPARTMENT: **Mathematical Sciences** PROGRAM: **ENGINEERING**

List below as specifically as possible the actions which the department plans to take as a result of this program review. Be sure to address any problem areas which you have discovered in your analysis of the program. Number each element of your plans separately and for each, please include a target date. Additionally, indicate by the number each institutional goal and objective which is addressed by each action plan. (See Institutional Goals and Objectives)

RECOMMENDATIONS TO IMPROVE STUDENT LEARNING OUTCOMES AND ACHIEVEMENT	Theme/Objective/ Strategy Number AHC from Strategic Plan	TARGET DATE
1. Offer classes increasingly more flipped to increase in-class problem solving.	SLS2, IR3	Fall 2022
2. Hold office hours in new MESA/STEM Center	SLS 3,45,6,7	Spring 2022

RECOMMENDATIONS TO ACCOMMODATE CHANGES IN STUDENT CHARACTERISTICS	Theme/Objective/ Strategy Number AHC from Strategic Plan	TARGET DATE
Enrollment Changes		
3. Continue to develop part-time faculty pool to ensure courses covered.	SLS 2, IR1	Ongoing
Demographic Changes		
4. Continue to encourage student involvement in MESA/STEM	SLS 2,3,4,5,6,7,8	Ongoing
5. Continue to encourage student involvement in professional organizations (Society of Women Engineering (SWE), Society of Hispanic Professional Engineers (SHPE), etc.)	SLS 2,3,4,5,6,7,8	Ongoing

RECOMMENDATIONS TO ACCOMMODATE CHANGES IN STUDENT CHARACTERISTICS	Theme/Objective/ Strategy Number AHC from Strategic Plan	TARGET DATE
Curricular Changes		
6. Develop Intro to Engineering design component (add to or supplement to ENGR 100).	SLS 2,3,4,6	Fall 2022
7. Develop a 3-unit MATLAB course	SLS 1,2,3,4,6, IR3	Fall 2022
8. Develop a 3-unit Engineering Computer Aided Drafting and Design Course	SLS 1,2,3,4,6, IR3	Fall 2023

Co-Curricular Changes 9. Investigate requirements of Architecture majors, vis-à-vis physics requirements.	SLS 2,3	Fall 2021
Neighboring College and University Plans 10. Submit LSAMP Bridges to the Baccalaureate proposal. 11. Work with universities and other community colleges to improve connections	SLS 2,3,4,5,6,7, IR2 SLS 3,4,6	Fall 2020 (DONE) Ongoing
Related Community Plans 12. Continue to develop connections with local engineers and companies.	SLS 3,4, E1	Ongoing

RECOMMENDATIONS THAT REQUIRE <u>ADDITIONAL RESOURCES</u>	**Theme/Objective/ Strategy Number AHC from Strategic Plan**	**TARGET DATE**
Facilities 13. Reduce noise of M-212 blowers. 14. Locate new office upon ending Department Chair term.	SLS 2,3,4, IR4 SLS 2,3,4,5,6,7 IR4	Fall 2021 Spring 2023
Equipment 15. Locate and install impact tester 16. Create loaner lab equipment/supply kit for ENGR 162 and ENGR 171 (COVID) 17. Software: MATLAB - Annual Community and Technical College license, 40 seats @ $40/seat = $1600/year 18. 3D Printers for projects (e.g., MakerBot Replicator) 3 @ $1,999 each	SLS 2, IR3 SLS 2,6 SLS 2,6, IR3 SLS 2,6, IR3	Fall 2021 Ongoing Annually Spring 2022
Staffing 19. Hire Lab Technician to support program. $40,000 - $80,000 20. Develop part-time faculty pool	SLS 2, IR1 SLS 2, IR1	Fall 2021 Fall 2021

Exhibits

E1. Student Data

Program Data

Contents

STEP 1|Choose subjects: ENGR

Subjects: ENGR

STEP 2|Choose awards: Engineering

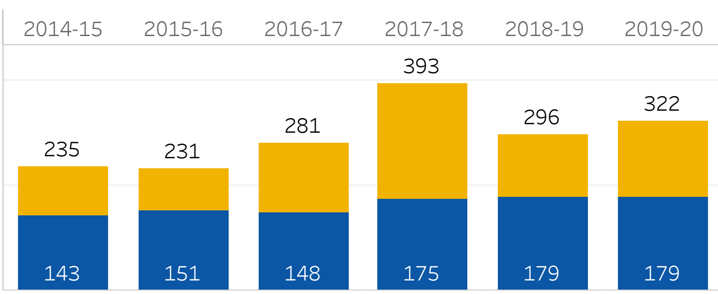
Awards: Engineering

STEP 3|Choose majors: Engineering

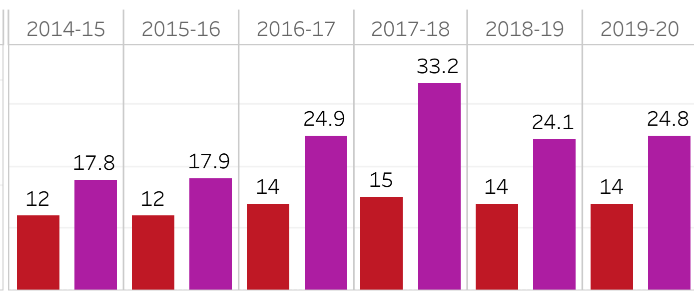
Student Majors: Engineering

Quick Program Facts

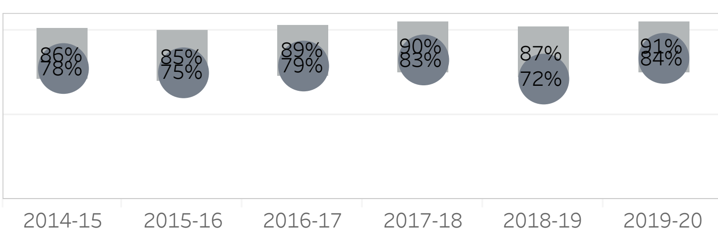
Headcount (undup)=Blue | Enrollment (dup)=Gold



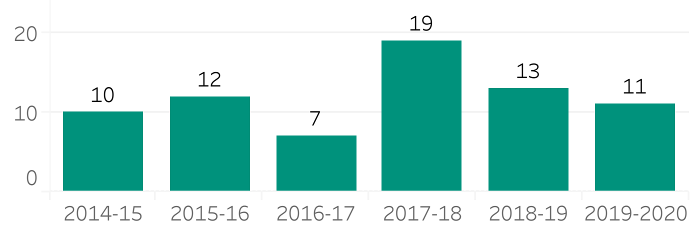
Sections=Red | FTES=Purple



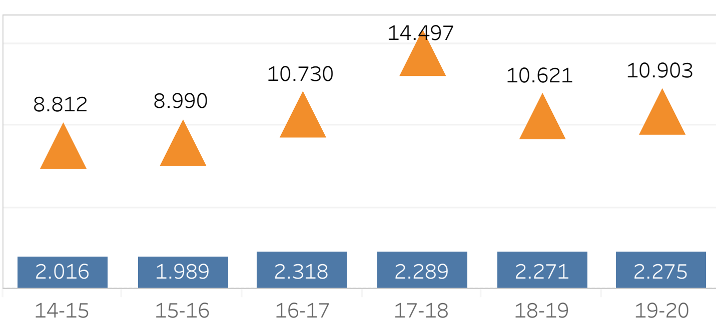
Retention=square | Success=circle



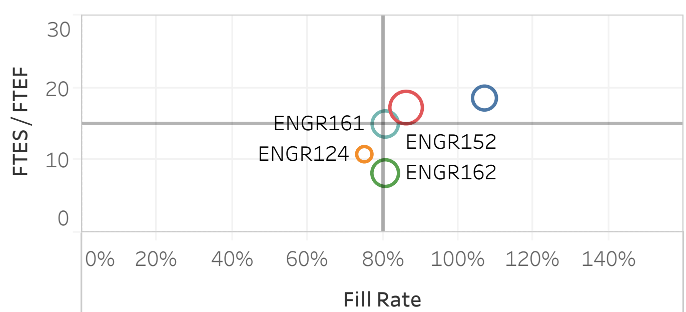
Credit Awards - Gold=Cert | Green=AA/AS / Pink=ADT



FTEF=Bar | FTES/FTEF=Triangle



Program Efficiency Fall 2019



Data Source: Student-MIS; Award, Major & Faculty-Banner | Headcount-unduplicated students; Enrollment-duplicated students; Retention-students who receive a grade in the course; Success-students who receive a passing grade in the course; FTES/FTEF target is 15+; Fill Rate target is 80%+

1 Outcomes ENGR

course_
All

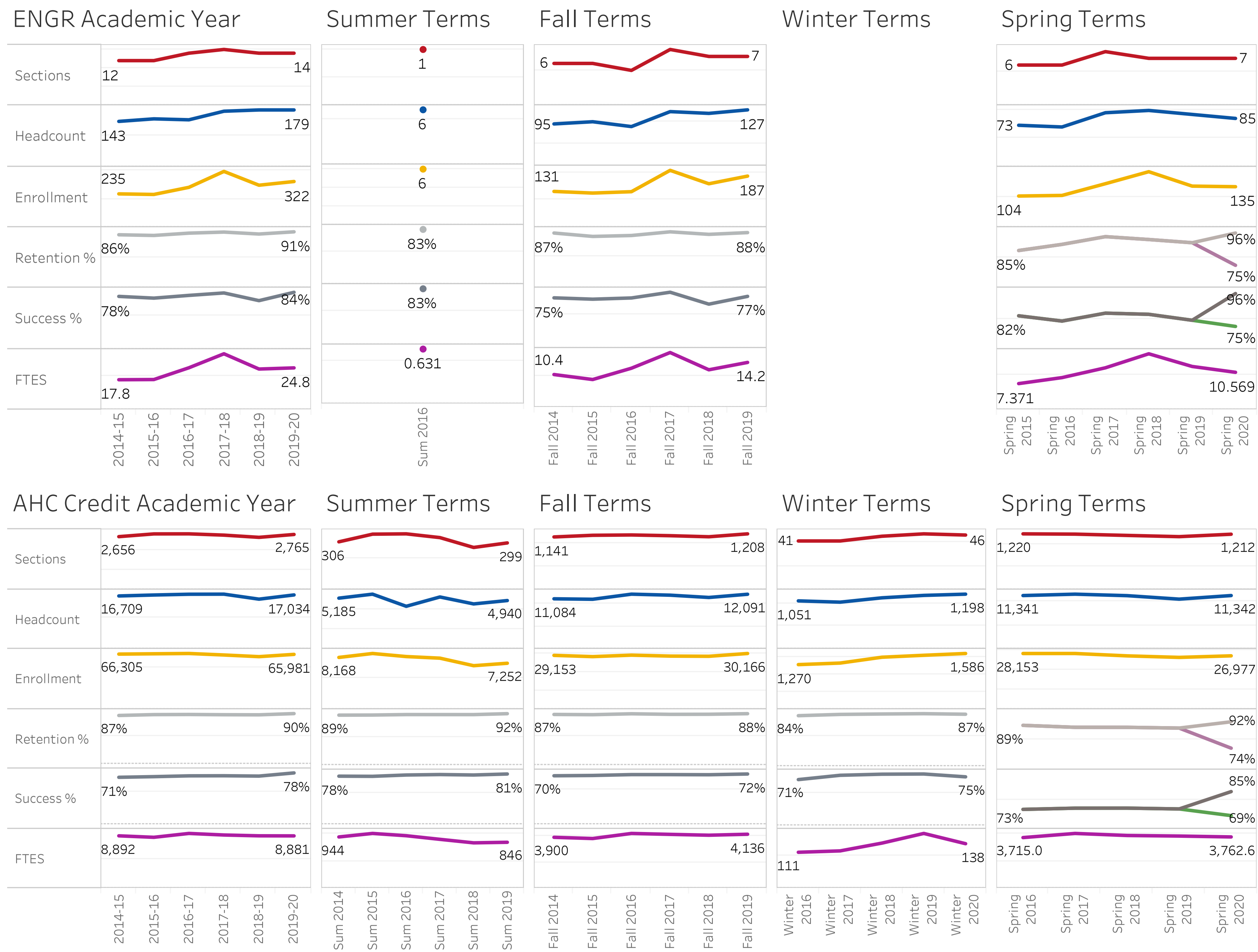
EW Grade
Exclude EW

	Fall 2014	Spring 2015	Fall 2015	Spring 2016	Sum 2016	Fall 2016	Spring 2017	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019	Spring 2020
Sections	6	6	6	6	1	5	8	8	7	7	7	7	7
Headcount	95	73	100	70	6	89	95	123	99	119	92	127	85
Enrollment	131	104	125	106	6	130	145	208	185	159	137	187	135
retained	114	88	102	94	5	108	136	185	170	135	123	164	101
Retention %	87%	85%	82%	89%	83%	83%	94%	89%	92%	85%	90%	88%	96%
success	98	85	91	83	5	97	121	173	153	104	108	144	101
Success %	75%	82%	73%	78%	83%	75%	83%	83%	83%	65%	79%	77%	96%
FTES	10.4	7.4	8.8	9.1	0.6	12.4	11.8	17.4	15.8	11.9	12.2	14.2	10.6

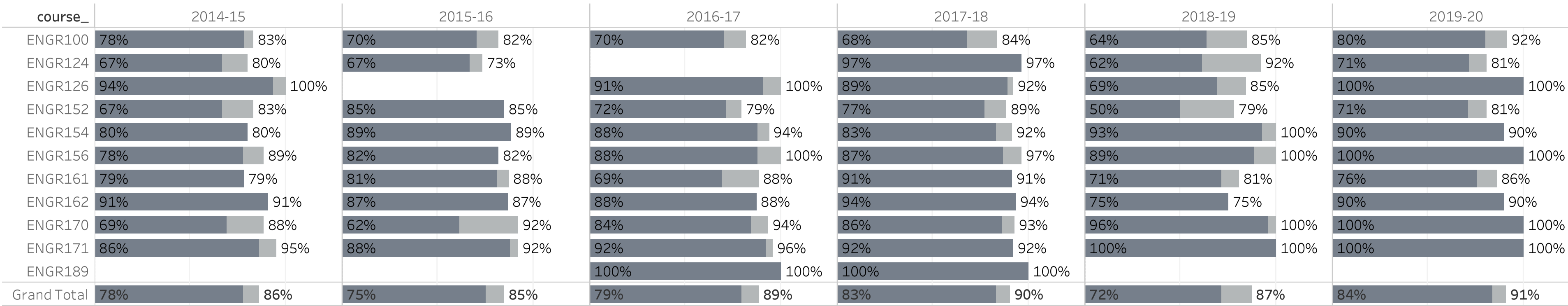
Outcomes Allan Hancock College Credit

	Sum 2014	Fall 2014	Spring 2015	Sum 2015	Fall 2015	Winter 2016	Spring 2016	Sum 2016	Fall 2016	Winter 2017	Spring 2017
Sections	306	1,141	1,209	355	1,177	41	1,220	357	1,184	41	1,214
Headco..	5,185	11,084	11,249	5,593	10,982	1,051	11,341	4,354	12,111	1,023	11,636
Enrollm..	8,168	29,153	28,984	8,789	28,471	1,270	28,153	8,305	29,268	1,314	28,161
Retention %	89%	87%	85%	90%	86%	84%	89%	90%	88%	87%	88%
Success %	78%	70%	71%	77%	70%	71%	73%	80%	71%	77%	74%
FTES	944	3,900	4,048	1,009	3,807	111	3,715	967	4,197	115	4,020

	Sum 2017	Fall 2017	Winter 2018	Spring 2018	Sum 2018	Fall 2018	Winter 2019	Spring 2019	Sum 2019	Fall 2019	Winter 2020	Spring 2020
Sections	333	1,168	45	1,186	270	1,145	47	1,159	299	1,208	46	1,212
Headco..	5,306	11,889	1,118	11,320	4,596	11,380	1,171	10,580	4,940	12,091	1,198	11,342
Enrollm..	8,052	28,754	1,480	26,960	6,868	28,650	1,535	26,193	7,252	30,166	1,586	26,977
Retention %	90%	87%	87%	88%	90%	87%	88%	88%	92%	88%	87%	92%
Success %	80%	71%	79%	74%	80%	71%	79%	74%	81%	72%	75%	85%
FTES	900	4,126	139	3,869	835	4,061	169	3,827	846	4,136	138	3,763


ENGR Academic Year
Summer Terms
Fall Terms
Winter Terms
Spring Terms
Sections
Headcount
Enrollment
Retention %
Success %
FTES
12
14
143
179
235
322
86%
91%
78%
84%
17.8
24.8
2014-15
2015-16
2016-17
2017-18
2018-19
2019-20
1
6
6
83%
83%
0.631
Sum 2016
6
7
95
127
131
187
87%
88%
75%
77%
10.4
14.2
Fall 2014
Fall 2015
Fall 2016
Fall 2017
Fall 2018
Fall 2019
6
7
73
85
104
135
85%
96%
75%
82%
96%
75%
7.371
10.569
Spring 2015
Spring 2016
Spring 2017
Spring 2018
Spring 2019
Spring 2020
AHC Credit Academic Year
Summer Terms
Fall Terms
Winter Terms
Spring Terms
Sections
Headcount
Enrollment
Retention %
Success %
FTES
2,656
2,765
16,709
17,034
66,305
65,981
87%
90%
71%
78%
8,892
8,881
2014-15
2015-16
2016-17
2017-18
2018-19
2019-20
306
299
5,185
4,940
8,168
7,252
89%
92%
78%
81%
944
846
Sum 2014
Sum 2015
Sum 2016
Sum 2017
Sum 2018
Sum 2019
1,141
1,208
11,084
12,091
29,153
30,166
87%
88%
70%
72%
3,900
4,136
Fall 2014
Fall 2015
Fall 2016
Fall 2017
Fall 2018
Fall 2019
41
46
1,051
1,198
1,270
1,586
84%
87%
71%
75%
111
138
Winter 2016
Winter 2017
Winter 2018
Winter 2019
Winter 2020
1,220
1,212
11,341
11,342
28,153
26,977
89%
92%
74%
73%
85%
69%
3,715.0
3,762.6
Spring 2016
Spring 2017
Spring 2018
Spring 2019
Spring 2020

1 Retention & Success by academic year by course ENGR

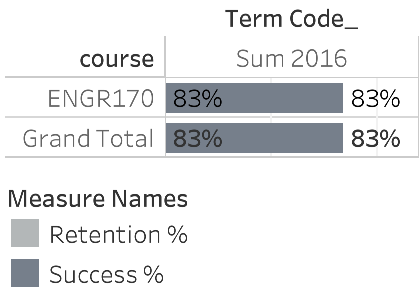


Retention % and Success % for each course_ broken down by Academic Year. Color shows details about Retention % and Success %. The data is filtered on TERM_CODE, CB04, subject and course. The TERM_CODE filter excludes 201410, 201420 and 201440. The CB04 filter keeps C, D and N. The subject filter keeps ENGR. The course filter has multiple members selected.

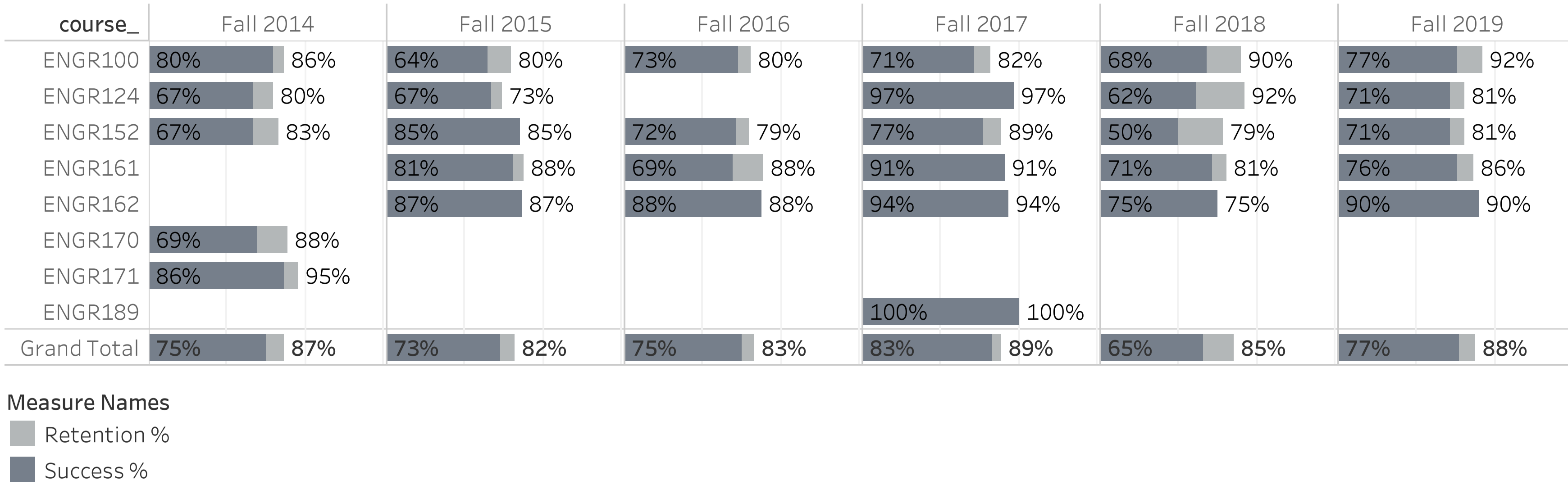
Measure Names

- Retention %
- Success %

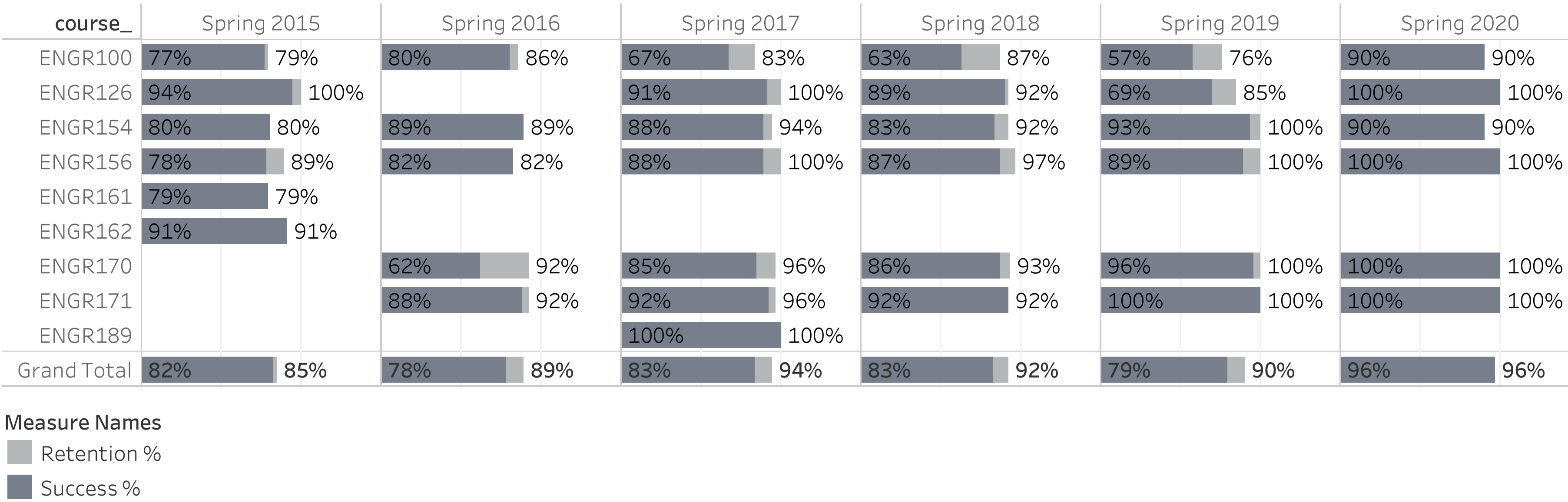
1 Retention & Success by summer term by course ENGR



1 Retention & Success by fall term by course ENGR



1 Retention & Success by spring term by course ENGR



2 Program Demographics ENGR

Choose individual course via filter or see Appendix A for full demographic course details

course_
All

Academic Year

	2014-15		2015-16		2016-17		2017-18		2018-19		2019-20	
Age Category	Headcount	FTES	Headcount	FTES	Headcount	FTES	Headcount	FTES	Headcount	FTES	Headcount	FTES
Under 20	47	2.49	54	4.17	46	2.97	70	3.82	91	5.25	83	4.37
20-24	69	10.15	71	8.71	76	18.33	77	22.66	65	14.71	65	14.64
25-29	17	3.96	21	3.64	20	2.82	25	6.06	21	2.91	21	2.58
30-34	5	0.69	4	0.91	3	0.26	5	0.49	5	1.02	7	2.82
35-39	2	0.06	1	0.03	1	0.15	1	0.03	1	0.10	2	0.11
40-49	2	0.09	3	0.28	1	0.25	1	0.03			1	0.05
50+	3	0.32	1	0.15	2	0.08	2	0.08	1	0.14	3	0.23

	2014-15		2015-16		2016-17		2017-18		2018-19		2019-20	
ETHNICITY	Headcount	FTES	Headcount	FTES	Headcount	FTES	Headcount	FTES	Headcount	FTES	Headcount	FTES
Asian	10	1.7	13	2.0	4	0.7	4	1.3	3	0.3	3	0.1
Black	1	0.0	2	0.1			1	0.0				
Filipino	5	0.8	9	0.8	4	0.6	9	1.5	7	1.0	7	1.1
Hispanic	84	8.6	84	9.4	101	16.8	101	19.8	104	14.3	102	16.3
NativeAm	3	0.9	3	0.3	2	0.1	3	0.8	8	0.7	2	1.5
PacIsl	1	0.0	1	0.0	1	0.2	1	0.7	1	0.0		
White	39	5.6	39	5.3	36	6.5	57	9.1	56	7.7	64	5.7

	2014-15		2015-16		2016-17		2017-18		2018-19		2019-20	
	Headcount	FTES	Headcount	FTES	Headcount	FTES	Headcount	FTES	Headcount	FTES	Headcount	FTES
Female	30	2.7	24	2.2	35	5.5	35	8.0	26	4.1	28	4.5
Male	112	15.0	126	15.4	112	19.0	137	24.8	153	20.0	147	20.2
Unknown	1	0.0	1	0.2	1	0.4	3	0.4			3	0.1

	2014-15		2015-16		2016-17		2017-18		2018-19		2019-20	
	Headcount	FTES	Headcount	FTES	Headcount	FTES	Headcount	FTES	Headcount	FTES	Headcount	FTES
First Time	18	0.6	23	0.8	18	0.6	44	1.4	52	1.7	52	1.7
First Time Transfer	6	0.5	4	0.1	1	0.0	8	0.6	6	0.9	6	0.5
Continuing	114	16.0	116	16.6	126	24.0	119	30.6	124	21.4	116	22.0
Returning	6	0.7	4	0.3	4	0.2	4	0.5	3	0.2	6	0.6
Special Admit			4	0.1	2	0.1	3	0.1				
Grand Total	**143**	**17.8**	**151**	**17.9**	**148**	**24.9**	**175**	**33.2**	**179**	**24.1**	**178**	**24.8**

2 Demographics Allan Hancock College Credit

	2014-15		2015-16		2016-17		2017-18		2018-19		2019-20	
Age Category	Headcount	FTES	Headcount	FTES	Headcount	FTES	Headcount	FTES	Headcount	FTES	Headcount	FTES
Under 20	4,269	2,742	4,528	2,759	5,805	3,105	6,308	3,155	6,018	3,326	7,482	3,583
20-24	6,122	3,441	6,054	3,341	5,700	3,398	5,460	3,190	5,057	3,070	4,867	2,853
25-29	2,585	1,182	2,555	1,118	2,440	1,255	2,395	1,212	2,071	1,101	2,060	1,089
30-34	1,542	563	1,533	528	1,379	578	1,327	556	1,173	560	1,130	507
35-39	944	320	969	292	924	357	891	328	758	319	844	342
40-49	1,212	400	1,262	356	1,042	379	1,040	384	801	328	874	324
50+	891	244	966	248	789	227	676	210	608	189	583	185

	2014-15		2015-16		2016-17		2017-18		2018-19		2019-20	
ETHNICITY	Headcount	FTES	Headcount	FTES	Headcount	FTES	Headcount	FTES	Headcount	FTES	Headcount	FTES
Asian	585	277	582	275	512	264	469	214	386	186	378	187
Black	617	340	673	359	583	326	555	278	459	259	491	278
Filipino	477	320	473	292	483	309	462	269	450	305	488	259
Hispanic	7,959	4,698	8,196	4,670	8,206	4,873	7,475	4,482	6,604	4,071	7,536	4,047
NativeAm	270	144	263	133	307	144	348	167	358	198	360	190
Other	5	1	2	0	4	1	5	2	2	1	2	1
PacIsl	122	59	97	50	119	62	141	62	131	74	167	81
White	6,671	3,050	6,728	2,862	7,016	3,146	7,819	3,541	7,236	3,751	7,129	3,648

	2014-15		2015-16		2016-17		2017-18		2018-19		2019-20	
	Headcount	FTES	Headcount	FTES	Headcount	FTES	Headcount	FTES	Headcount	FTES	Headcount	FTES
Female	8,253	4,714	8,360	4,479	8,768	4,922	8,937	4,913	8,454	4,877	8,777	4,837
Male	8,445	4,174	8,643	4,159	8,340	4,181	8,126	4,049	7,027	3,916	7,521	3,767
Unknown	3	2	3	2	109	23	181	51	121	52	228	88

	2014-15		2015-16		2016-17		2017-18		2018-19		2019-20	
	Headcount	FTES	Headcount	FTES	Headcount	FTES	Headcount	FTES	Headcount	FTES	Headcount	FTES
First Time	2,904	1,176	2,920	1,185	2,777	1,194	2,562	1,089	2,666	1,240	2,620	1,189
First Time Transfer	2,408	598	2,634	616	2,111	541	2,352	656	1,766	564	1,540	447
Continuing	10,402	6,334	10,178	5,991	10,502	6,487	9,986	6,305	9,576	6,120	9,325	5,977
Returning	3,039	672	3,196	675	2,277	551	2,382	539	1,964	496	2,231	504
Special Admit	560	107	935	173	2,260	353	2,578	424	2,281	425	3,521	574
Unknown	13	3	6	2	4	0	1	0	1	0	2	0
Grand Total	**16,700**	**8,890**	**17,004**	**8,641**	**17,217**	**9,126**	**17,235**	**9,014**	**15,597**	**8,845**	**16,523**	**8,691**

3 Program Equity Outcomes ENGR

Percentage Point Gap (PPG)-compare a group outcome to the overall outcome, if group is 3% less or lower than overall then group is disproportionately impacted.

PPG Mod-same as PPG except overall outcome is modified to NOT include group outcome.

PPG Impact-amount of students needed to have a positive outcome in order to have the group reach equity.

Equity Outcomes only work for a single subject. Contact IE to get data for multiple subjects

	Academic Year 2019-20									
	Headcount	Enrollment	EW count	FTES	Retention %	PPG Retention Mod	PPG Retention Impact	Success %	PPG Success Mod	PPG Success Impact
Under 20	83	96	5	4.4	85.7%	-7.3%	8	73.6%	-14.9%	15
20-24	65	158	15	14.6	91.6%	1.7%		87.4%	6.9%	
25-29	21	33	5	2.6	92.9%	2.3%		82.1%	-1.9%	1
30-34	7	28	4	2.8	100.0%			100.0%		
35-39	2	3	1	0.1	100.0%			100.0%		
40-49	1	1	0	0.0	100.0%			100.0%		
50+	3	3	0	0.2	100.0%			100.0%		
Grand Total	**179**	**322**	**30**	**24.8**	**90.8%**			**83.9%**		

3 Program Equity Outcomes ENGR

Percentage Point Gap (PPG)-compare a group outcome to the overall outcome, if group is 3% less or lower than overall then group is disproportionately impacted.
PPG Mod-same as PPG except overall outcome is modified to NOT include group outcome.
PPG Impact-amount of students needed to have a positive outcome in order to have the group reach equity.

Equity Outcomes only work for a single subject. Contact IE to get data for multiple subjects

	Academic Year 2019-20									
	Headcount	Enrollment	EW count	FTES	Retention %	PPG Retention Mod	PPG Retention Impact	Success %	PPG Success Mod	PPG Success Impact
Asian	3	3	0	0.1	100.0%			66.7%		
Filipino	7	15	1	1.1	100.0%			100.0%		
Hispanic	102	199	24	16.3	88.6%	-5.4%	11	82.9%	-2.6%	6
Native Am	2	14	0	1.5	100.0%			100.0%		
White	64	90	5	5.7	91.8%	1.4%		81.2%	-3.8%	4
Unknown	1	1	0	0.0	100.0%			100.0%		
Grand Total	**179**	**322**	**30**	**24.8**	**90.8%**			**83.9%**		

3 Program Equity Outcomes ENGR

Percentage Point Gap (PPG)-compare a group outcome to the overall outcome, if group is 3% less or lower than overall then group is disproportionately impacted.

PPG Mod-same as PPG except overall outcome is modified to NOT include group outcome.

PPG Impact-amount of students needed to have a positive outcome in order to have the group reach equity.

Equity Outcomes only work for a single subject. Contact IE to get data for multiple subjects

	Academic Year 2019-20									
	Headcount	Enrollment	EW count	FTES	Retention %	PPG Retention Mod	PPG Retention Impact	Success %	PPG Success Mod	PPG Success Impact
Female	28	56	2	4.5	85.2%	-6.8%	4	79.6%	-5.2%	3
Male	148	263	27	20.3	91.9%	6.2%		84.7%	4.4%	
Unknown	3	3	1	0.1	100.0%			100.0%		
Grand Total	**179**	**322**	**30**	**24.8**	**90.8%**			**83.9%**		

3 Program Equity Outcomes ENGR

Percentage Point Gap (PPG)-compare a group outcome to the overall outcome, if group is 3% less or lower than overall then group is disproportionately impacted.
PPG Mod-same as PPG except overall outcome is modified to NOT include group outcome.
PPG Impact-amount of students needed to have a positive outcome in order to have the group reach equity.

Equity Outcomes only work for a single subject. Contact IE to get data for multiple subjects

	Academic Year 2019-20									
	Headcount	Enrollment	EW count	FTES	Retention %	PPG Retention Mod	PPG Retention Impact	Success %	PPG Success Mod	PPG Success Impact
First Time	53	53	0	1.7	86.8%	-4.8%	3	73.6%	-12.6%	7
First Time Tran..	6	7	2	0.5	100.0%			100.0%		
Continuing	116	254	28	22.0	91.2%	1.8%		85.4%	6.6%	
Returning	6	8	0	0.6	100.0%			100.0%		
Grand Total	**179**	**322**	**30**	**24.8**	**90.8%**			**83.9%**		

3 Allan Hancock College Credit Equity Outcomes

Equity:
Percentage Point Gap (PPG)-compare a group outcome to the overall outcome, if group is 3% less or lower than overall then group is disproportionately impacted.
PPG Mod-same as PPG except overall outcome is modified to NOT include group outcome.
PPG Impact-amount of students needed to have a positive outcome in order to have the group reach equity

	Academic Year 2019-20						
	Headcount	Enrollment	EW count	FTES	Retention %	PPG AHC Retention Mod	PPG AHC Retention Impact
Under 20	7,482	28,282	2,460	3,583	90.4%	0.9%	
20-24	4,867	20,725	1,537	2,853	88.8%	-1.6%	330
25-29	2,060	7,055	437	1,089	89.4%	-0.5%	38
30-34	1,130	3,508	196	507	91.3%	1.5%	
35-39	844	2,403	154	342	90.2%	0.4%	
40-49	874	2,442	235	324	91.1%	1.3%	
50+	583	1,566	182	185	91.5%	1.7%	
Grand Total	**17,034**	**65,981**	**5,201**	**8,881**	**89.9%**		

3 Allan Hancock College Credit Equity Outcomes

Equity:
Percentage Point Gap (PPG)-compare a group outcome to the overall outcome, if group is 3% less or lower than overall then group is disproportionately impacted.
PPG Mod-same as PPG except overall outcome is modified to NOT include group outcome.
PPG Impact-amount of students needed to have a positive outcome in order to have the group reach equity

	Academic Year 2019-20						
	Headcount	Enrollment	EW count	FTES	Success %	PPG AHC Success Mod	PPG AHC Success Impact
Under 20	7,482	28,282	2,460	3,583	76.0%	-3.6%	1,024
20-24	4,867	20,725	1,537	2,853	77.6%	-0.7%	144
25-29	2,060	7,055	437	1,089	79.6%	1.7%	
30-34	1,130	3,508	196	507	83.5%	5.8%	
35-39	844	2,403	154	342	82.9%	5.0%	
40-49	874	2,442	235	324	85.6%	7.8%	
50+	583	1,566	182	185	83.3%	5.3%	
Grand Total	**17,034**	**65,981**	**5,201**	**8,881**	**78.1%**		

3 Allan Hancock College Credit Equity Outcomes

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Percentage Point Gap (PPG)-compare a group outcome to the overall outcome, if group is 3% less or lower than overall then group is disproportionately impacted.

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PPG Impact-amount of students needed to have a positive outcome in order to have the group reach equity

	Academic Year 2019-20						
	Headcount	Enrollment	EW count	FTES	Retention %	PPG AHC Retention Mod	PPG AHC Retention Impact
Asian	378	1,366	84	187	90.2%	0.3%	
Black	491	1,928	176	278	88.8%	-1.1%	22
Filipino	488	1,813	134	259	91.2%	1.4%	
Hispanic	7,536	30,439	2,709	4,047	88.7%	-2.2%	671
Native Am	360	1,475	151	190	85.9%	-4.1%	60
Other	2	7	0	1	100.0%		
Pac Isl	167	663	73	81	88.6%	-1.2%	8
White	7,129	26,825	1,707	3,648	91.3%	2.5%	
Unknown	516	1,465	167	190	90.8%	0.9%	
Grand Total	**17,034**	**65,981**	**5,201**	**8,881**	**89.9%**		

3 Allan Hancock College Credit Equity Outcomes

Equity:
Percentage Point Gap (PPG)-compare a group outcome to the overall outcome, if group is 3% less or lower than overall then group is disproportionately impacted.
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	Academic Year 2019-20						
	Headcount	Enrollment	EW count	FTES	Success %	PPG AHC Success Mod	PPG AHC Success Impact
Asian	378	1,366	84	187	79.5%	1.4%	
Black	491	1,928	176	278	75.2%	-3.0%	58
Filipino	488	1,813	134	259	80.0%	2.0%	
Hispanic	7,536	30,439	2,709	4,047	75.2%	-5.4%	1,636
Native Am	360	1,475	151	190	73.9%	-4.3%	64
Other	2	7	0	1	100.0%		
Pac Isl	167	663	73	81	72.4%	-5.8%	38
White	7,129	26,825	1,707	3,648	81.7%	6.2%	
Unknown	516	1,465	167	190	76.9%	-1.2%	18
Grand Total	**17,034**	**65,981**	**5,201**	**8,881**	**78.1%**		

3 Allan Hancock College Credit Equity Outcomes

Equity:
Percentage Point Gap (PPG)-compare a group outcome to the overall outcome, if group is 3% less or lower than overall then group is disproportionately impacted.
PPG Mod-same as PPG except overall outcome is modified to NOT include group outcome.
PPG Impact-amount of students needed to have a positive outcome in order to have the group reach equity

	Academic Year 2019-20						
	Headcount	Enrollment	EW count	FTES	Retention %	PPG AHC Retention Mod	PPG AHC Retention Impact
Female	8,967	36,046	2,443	4,909	89.4%	-0.9%	337
Male	7,769	29,148	2,626	3,869	90.4%	0.9%	
Unknown	302	787	132	103	90.5%	0.7%	
Grand Total	**17,034**	**65,981**	**5,201**	**8,881**	**89.9%**		

3 Allan Hancock College Credit Equity Outcomes

Equity:
Percentage Point Gap (PPG)-compare a group outcome to the overall outcome, if group is 3% less or lower than overall then group is disproportionately impacted.
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	Academic Year 2019-20						
	Headcount	Enrollment	EW count	FTES	Success %	PPG AHC Success Mod	PPG AHC Success Impact
Female	8,967	36,046	2,443	4,909	78.5%	0.8%	
Male	7,769	29,148	2,626	3,869	77.7%	-0.7%	193
Unknown	302	787	132	103	74.2%	-3.9%	31
Grand Total	**17,034**	**65,981**	**5,201**	**8,881**	**78.1%**		

3 Allan Hancock College Credit Equity Outcomes

Equity:

Percentage Point Gap (PPG)-compare a group outcome to the overall outcome, if group is 3% less or lower than overall then group is disproportionately impacted.

PPG Mod-same as PPG except overall outcome is modified to NOT include group outcome.

PPG Impact-amount of students needed to have a positive outcome in order to have the group reach equity

	Academic Year 2019-20						
	Headcount	Enrollment	EW count	FTES	Retention %	PPG AHC Retention Mod	PPG AHC Retention Impact
First Time	2,748	9,927	213	1,241	87.4%	-2.9%	290
First Time Tran..	1,674	3,393	172	488	92.2%	2.5%	
Continuing	9,472	42,926	4,002	6,043	89.4%	-1.4%	581
Returning	2,235	4,167	302	504	88.1%	-1.9%	78
Special Admit	3,739	5,565	511	605	98.1%	9.0%	
Unknown	2	3	1	0	100.0%		
Grand Total	**17,034**	**65,981**	**5,201**	**8,881**	**89.9%**		

3 Allan Hancock College Credit Equity Outcomes

Equity:

Percentage Point Gap (PPG)-compare a group outcome to the overall outcome, if group is 3% less or lower than overall then group is disproportionately impacted.

PPG Mod-same as PPG except overall outcome is modified to NOT include group outcome.

PPG Impact-amount of students needed to have a positive outcome in order to have the group reach equity

	Academic Year 2019-20						
	Headcount	Enrollment	EW count	FTES	Success %	PPG AHC Success Mod	PPG AHC Success Impact
First Time	2,748	9,927	213	1,241	65.6%	-14.9%	1,481
First Time Tran..	1,674	3,393	172	488	81.6%	3.7%	
Continuing	9,472	42,926	4,002	6,043	79.4%	3.6%	
Returning	2,235	4,167	302	504	75.9%	-2.3%	96
Special Admit	3,739	5,565	511	605	91.7%	14.8%	
Unknown	2	3	1	0	100.0%		
Grand Total	**17,034**	**65,981**	**5,201**	**8,881**	**78.1%**		

4 Online / Onsite course comparison ENGR

All online courses and matching onsite courses

4 Online / Onsite Retention & Success course comparison ENGR

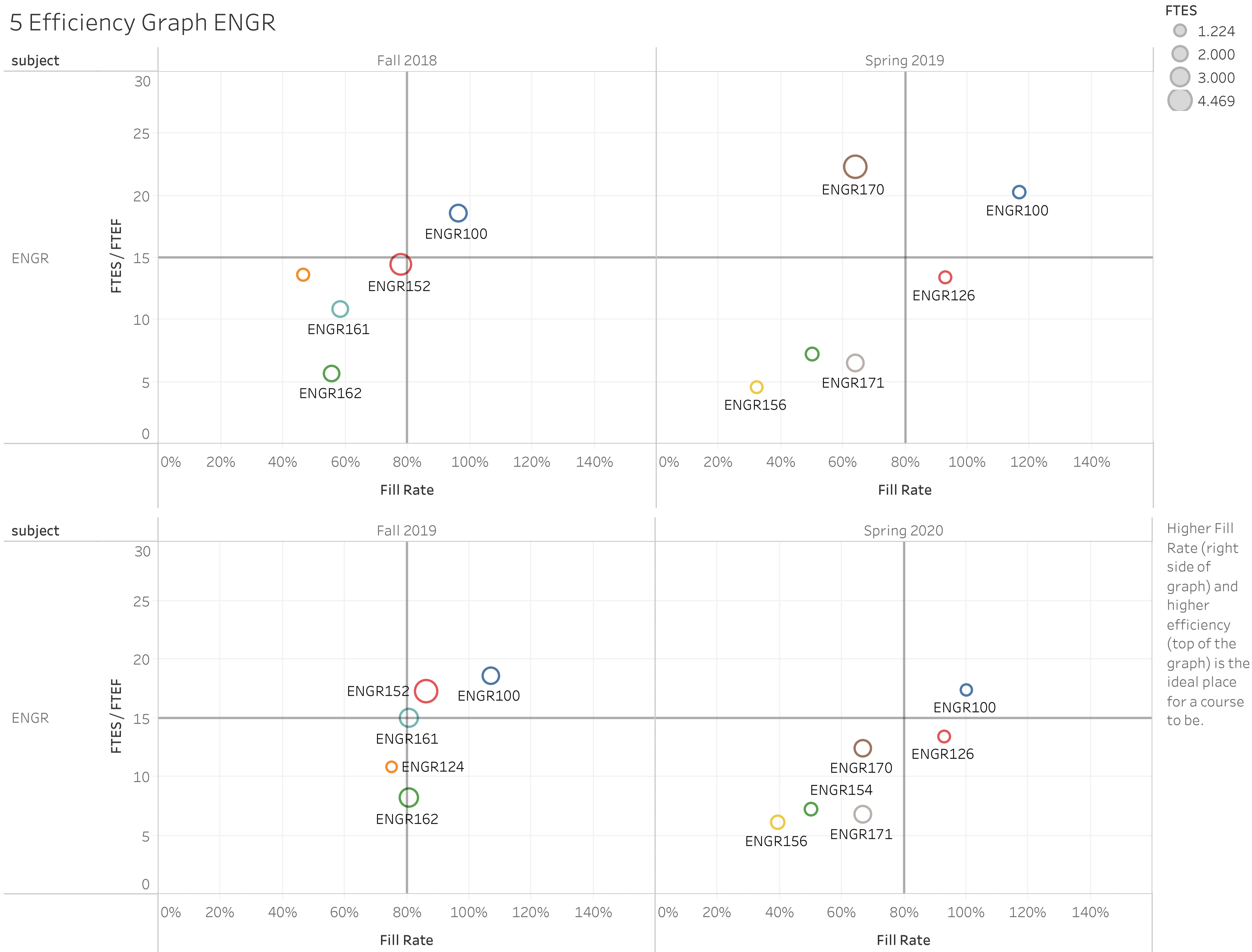
All online courses and matching onsite courses

Measure Names

4 Online / Onsite credit course comparison Allan Hancock College

		Academic Year				
Course Type		2015-16	2016-17	2017-18	2018-19	2019-20
Online	Headcount	7,580	7,006	7,152	6,744	7,040
	Enrollment	15,710	15,695	15,548	15,081	15,957
	Sections	509	517	501	457	487
	Retention %	83%	83%	84%	85%	87%
	Success %	64%	66%	67%	68%	73%
	FTES	1,496	1,524	1,523	1,490	1,569
Onsite	Headcount	13,623	14,458	14,466	13,515	14,715
	Enrollment	50,973	51,353	49,698	48,165	50,024
	Sections	2,284	2,279	2,231	2,164	2,278
	Retention %	90%	90%	89%	89%	91%
	Success %	75%	76%	76%	75%	80%
	FTES	7,145	7,775	7,511	7,403	7,313
Grand Total	Headcount	17,009	17,251	17,276	15,700	17,034
	Enrollment	66,683	67,048	65,246	63,246	65,981
	Sections	2,793	2,796	2,732	2,621	2,765
	Retention %	88%	88%	88%	88%	90%
	Success %	72%	74%	74%	73%	78%
	FTES	8,642	9,298	9,034	8,893	8,881

5 Efficiency Graph ENGR



Higher Fill Rate (right side of graph) and higher efficiency (top of the graph) is the ideal place for a course to be.

5 Efficiency Table ENGR

Academic Year	Term Code_	course_	FTES	FTEF+	FTES / FTEF	Enrollment	Maximum Enrollment	MaxEnroll..	Fill Rate
2018-19	Fall 2018	ENGR100	2.5	0.134	18.6	77	80	40.0	96%
		ENGR124	1.3	0.094	13.6	13	28	28.0	46%
		ENGR152	3.8	0.263	14.5	28	36	36.0	78%
		ENGR161	2.2	0.200	10.9	21	36	36.0	58%
		ENGR162	2.1	0.376	5.7	20	36	18.0	56%
		Total	**11.9**	**1.067**	**11.2**	**159**	**216**	**30.9**	**74%**
	Spring 2019	ENGR100	1.4	0.067	20.3	42	36	36.0	117%
		ENGR126	1.3	0.094	13.4	26	28	28.0	93%
		ENGR154	1.5	0.200	7.3	14	28	28.0	50%
		ENGR156	1.2	0.267	4.6	9	28	28.0	32%
		ENGR170	4.5	0.200	22.3	23	36	36.0	64%
		ENGR171	2.5	0.376	6.5	23	36	18.0	64%
		Total	**12.2**	**1.204**	**10.2**	**137**	**192**	**27.4**	**71%**
	Total		**24.1**	**2.271**	**10.6**	**296**	**408**	**29.1**	**73%**
2019-20	Fall 2019	ENGR100	2.5	0.134	18.6	77	72	36.0	107%
		ENGR124	1.0	0.094	10.9	21	28	28.0	75%
		ENGR152	4.6	0.267	17.3	31	36	36.0	86%
		ENGR161	3.0	0.200	15.0	29	36	36.0	81%
		ENGR162	3.1	0.376	8.2	29	36	18.0	81%
		Total	**14.2**	**1.071**	**13.3**	**187**	**208**	**29.7**	**90%**
	Spring 2020	ENGR100	1.2	0.067	17.4	36	36	36.0	100%
		ENGR126	1.3	0.094	13.4	26	28	28.0	93%
		ENGR154	1.5	0.200	7.3	14	28	28.0	50%
		ENGR156	1.6	0.267	6.1	11	28	28.0	39%
		ENGR170	2.5	0.200	12.4	24	36	36.0	67%
		ENGR171	2.6	0.376	6.8	24	36	18.0	67%
		Total	**10.6**	**1.204**	**8.8**	**135**	**192**	**27.4**	**70%**
	Total		**24.8**	**2.275**	**10.9**	**322**	**400**	**28.6**	**81%**
Grand Total			**48.9**	**4.546**	**10.8**	**618**	**808**	**28.9**	**76%**

6 Degree/Certificate Engineering

					Academic Year Graduation Desc					
	Program Desc	Degree	Degree Major	Degree Desc (group)	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Unduplicated	Engineering	AA	Engineering	Associate in Arts (A)	10	12	7	19	13	11
Duplicated	Engineering	AA	Engineering	Associate in Arts (A)	10	12	7	19	13	11
Unduplicated	Total				**10**	**12**	**7**	**19**	**13**	**11**
Duplicated	Total				**10**	**12**	**7**	**19**	**13**	**11**

6 Majors Engineering - Headcount

	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Engineering	666	720	739	681	662	661
Grand Total	**666**	**720**	**739**	**681**	**662**	**661**

6 Engineering Award|Major Match

--If a student has the same program of study and major as the award earned they will be a 'Major Match'. If not they will be a 'Major Split'.

--Headcount & Percentages are the students who are a major match/split for a specific award.

--Data is sorted by program/major of the earned award.

					Academic Year Graduation Desc											
					2014-2015		2015-2016		2016-2017		2017-2018		2018-2019		2019-2020	
Program..	Degree	Degree Major	Degree Desc (group)	Major ..	HC	%	HC	%	HC	%	HC	%	HC	%	HC	%
Engineer..	AA	Engineering	Associate in Arts (A)	Match	7	70%	10	83%	4	57%	12	63%	11	85%	8	73%
				Split	3	30%	2	17%	3	43%	7	37%	2	15%	3	27%
	Total				10	100%	12	100%	7	100%	19	100%	13	100%	11	100%

6 Degree/Certificate Allan Hancock College

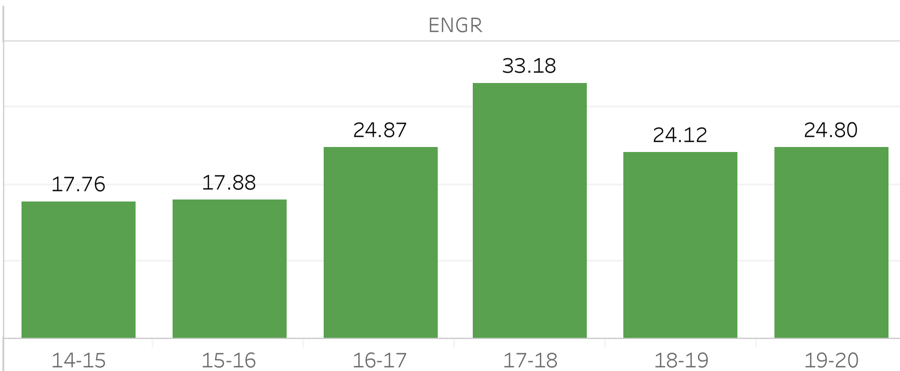
		Academic Year Graduation Desc					
	Degree Desc (group)	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Unduplicated	6 to fewer than 18 units (E)	235	253	318	303	277	246
	12 to fewer than 18 units (B)		1		11	11	16
	18 to fewer than 30 units (L)	172	149	180	146	168	113
	30 to fewer than 60 units (T)	555	511	596	634	697	674
	60+ units (F)	37	38	34	33	38	28
	Associate in Arts - Transfer	42	92	126	159	163	218
	Associate in Arts (A)	571	494	523	493	589	880
	Associate in Science - Transfe	90	95	128	126	191	226
	Associate in Science (S)	299	277	319	313	321	304
	NC Cert 48 to <96 hrs (H)	29	3	10	22	21	8
	NC Cert 192 to <288 hrs (K)	5	7	5	1	6	13
	NC Cert 288 to <480 hrs (P)	4	2	27	46	38	31
	NC Cert 480 to <960 hrs (Q)				2	9	29
	Other Credit Award <6 units(O)	42	129	124	126	94	151
Duplicated	6 to fewer than 18 units (E)	240	261	365	330	299	267
	12 to fewer than 18 units (B)		1		11	11	16
	18 to fewer than 30 units (L)	184	157	188	166	182	122
	30 to fewer than 60 units (T)	575	527	624	671	738	700
	60+ units (F)	37	38	34	33	38	28
	Associate in Arts - Transfer	42	95	130	163	164	229
	Associate in Arts (A)	795	709	726	737	814	1,434
	Associate in Science - Transfe	98	99	133	138	207	235
	Associate in Science (S)	318	307	347	345	350	335
	NC Cert 48 to <96 hrs (H)	29	3	10	23	21	8
	NC Cert 192 to <288 hrs (K)	5	7	5	1	6	13
	NC Cert 288 to <480 hrs (P)	4	2	34	46	39	32
	NC Cert 480 to <960 hrs (Q)				2	9	29
	Other Credit Award <6 units(O)	63	142	136	150	105	161
Unduplicated	Total	**1,517**	**1,491**	**1,703**	**1,673**	**1,802**	**1,923**
Duplicated	Total	**2,390**	**2,348**	**2,732**	**2,816**	**2,983**	**3,609**

7 FTEF+Overload, FTES & Efficiency - ENGR

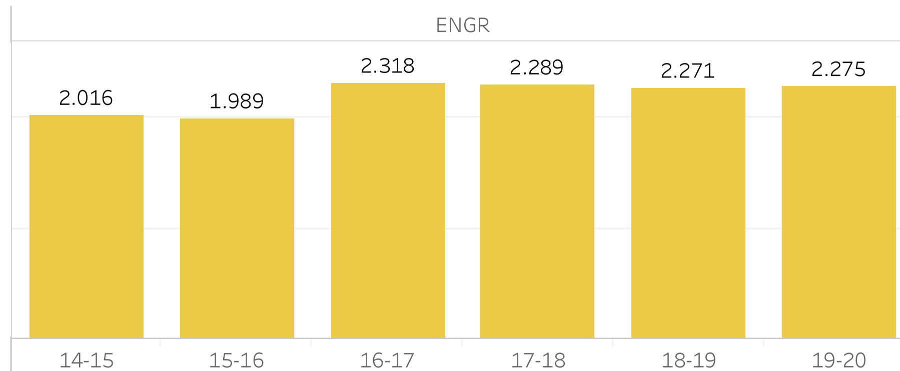
Academic Year

2014-2015			2015-2016			2016-2017			2017-2018			2018-2019			2019-2020		
FTEF+	FTES	FTES / FTEF	FTEF+	FTES	FTES / FTEF	FTEF+	FTES	FTES / FTEF	FTEF+	FTES	FTES / FTEF	FTEF+	FTES	FTES / FTEF	FTEF+	FTES	FTES / FTEF
2.016	17.76	8.81	1.989	17.88	8.99	2.318	24.87	10.73	2.289	33.18	14.50	2.271	24.12	10.62	2.275	24.80	10.90

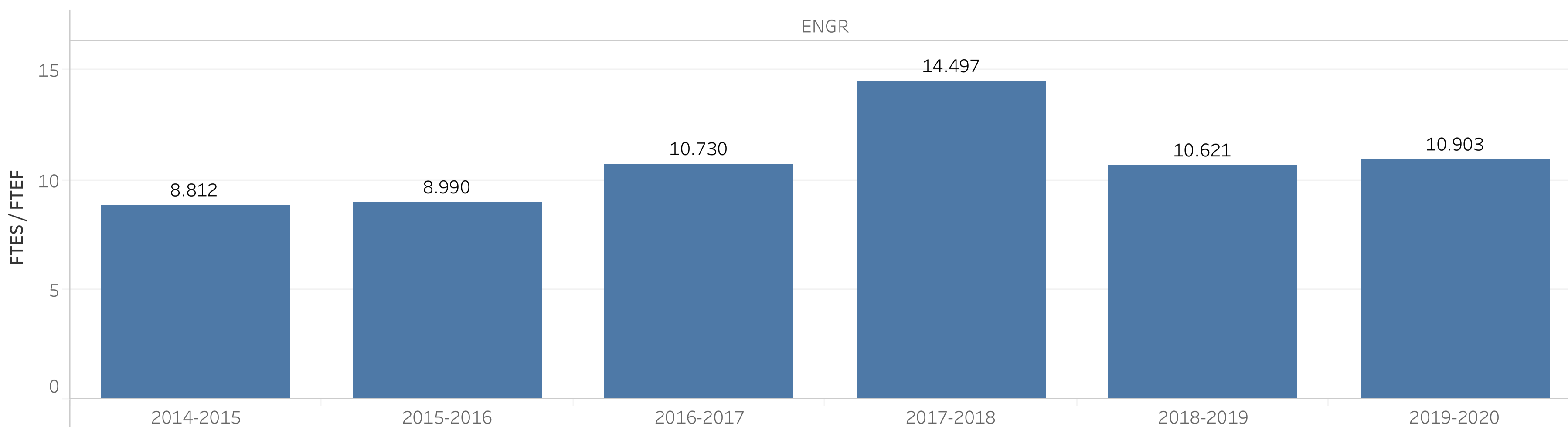
FTES



FTEF



FTEF/ FTES



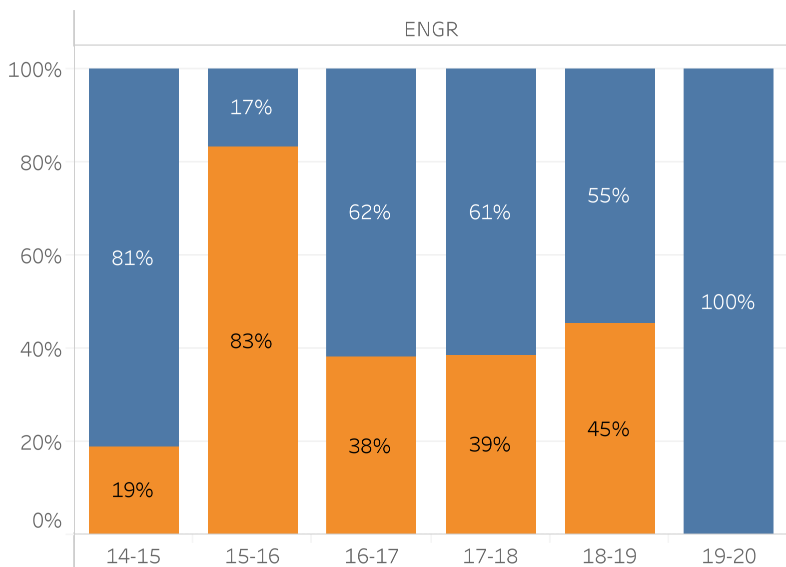
7 FTEF, overload, sections by faculty type ENGR

SUBJECT	Faculty Type	2014-2015 FTEF	2014-2015 Overload	2014-2015 Faculty	2014-2015 Sections	2015-2016 FTEF	2015-2016 Overload	2015-2016 Faculty	2015-2016 Sections	2016-2017 FTEF	2016-2017 Overload	2016-2017 Faculty	2016-2017 Sections
ENGR	Instructional - FT	1.200	0.534	1.00	10.00	0.334	0.000	1.00	3.00	1.218	0.348	1.00	10.00
	Instructional - PT	0.282	0.000	1.00	2.00	1.655	0.000	4.00	9.00	0.752	0.000	1.00	4.00
Grand Total		**1.482**	**0.534**	**2.00**	**12.00**	**1.989**	**0.000**	**4.00**	**12.00**	**1.970**	**0.348**	**2.00**	**14.00**

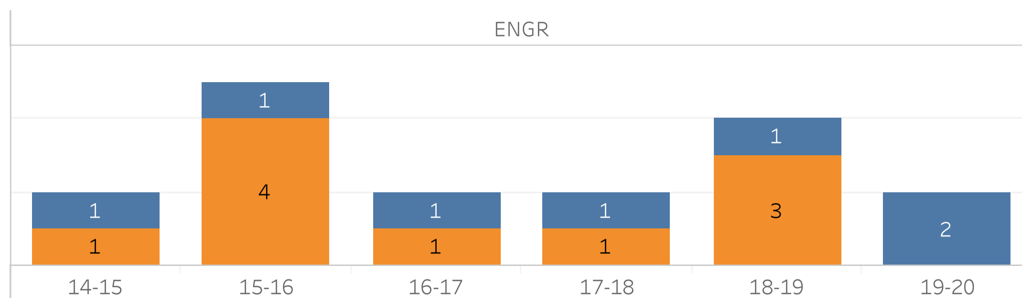
SUBJECT	Faculty Type	2017-2018 FTEF	2017-2018 Overload	2017-2018 Faculty	2017-2018 Sections	2018-2019 FTEF	2018-2019 Overload	2018-2019 Faculty	2018-2019 Sections	2019-2020 FTEF	2019-2020 Overload	2019-2020 Faculty	2019-2020 Sections
ENGR	Instructional - FT	1.20	0.34	1.00	11.00	1.15	0.16	1.00	10.00	1.58	0.70	2.00	14.00
	Instructional - PT	0.75	0.00	1.00	4.00	0.96	0.00	3.00	6.00				
Grand Total		**1.95**	**0.34**	**2.00**	**15.00**	**2.11**	**0.16**	**4.00**	**14.00**	**1.58**	**0.70**	**2.00**	**14.00**

Faculty Type
Instructional - FT
Instructional - PT

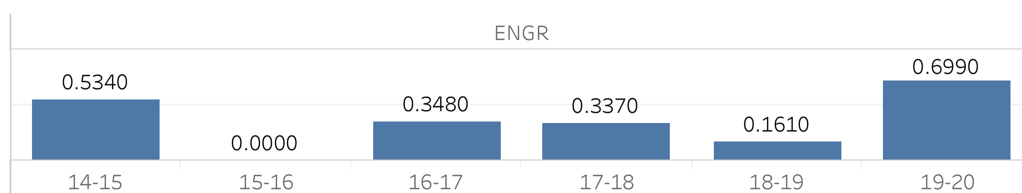
%FTEF by Faculty Type



Faculty count by type



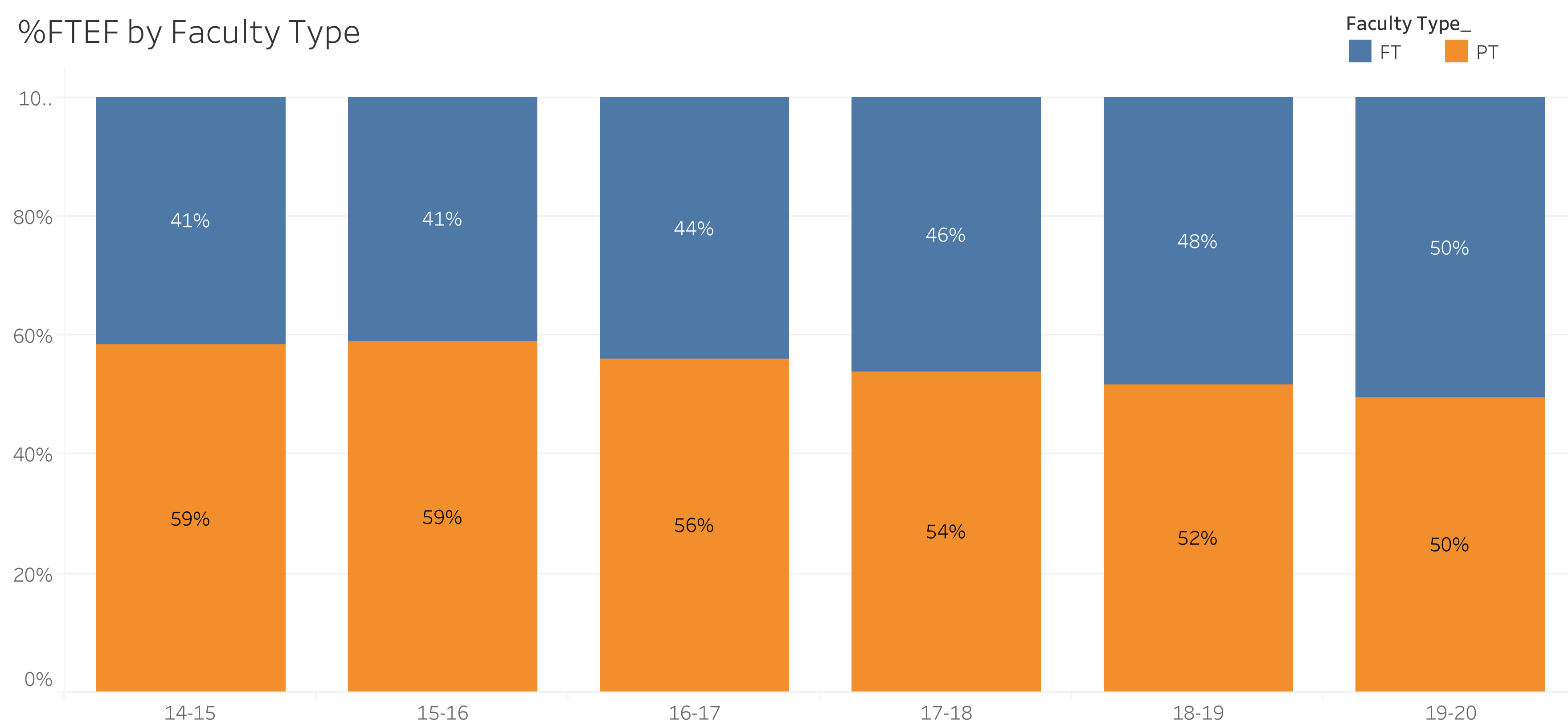
Overload



7 FTEF+Overload by Faculty Type Allan Hancock College

		Academic Year					
Instruction Type	Faculty Type	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Instructional	Instructional - FT	277.160	288.448	307.136	313.022	314.389	311.083
	Instructional - PT	358.454	379.747	356.486	332.909	314.331	298.089
	Total	**635.614**	**668.195**	**663.622**	**645.931**	**628.720**	**609.172**
NonInstructional	NonInstructional - FT	73.988	70.677	70.965	74.347	77.457	94.311
	NonInstructional - PT	34.646	35.110	33.486	35.313	29.225	25.802
	Total	**108.634**	**105.787**	**104.451**	**109.660**	**106.682**	**120.113**
Grand Total		**744.248**	**773.982**	**768.073**	**755.591**	**735.402**	**729.285**

%FTEF by Faculty Type



Appendix A: Program/Course Demographics by Outcome ENGR

		Academic Year											
		2017-18				2018-19				2019-20			
		Headcou..	FTES	Retention %	Success %	Headcou..	FTES	Retention %	Success %	Headcou..	FTES	Retention %	Success %
ENGR100	Under 20	60	1.94	88%	70%	78	2.66	87%	62%	74	2.43	89%	76%
	20-24	28	0.91	82%	68%	25	0.81	84%	68%	27	0.91	96%	84%
	25-29	9	0.29	78%	78%	10	0.32	70%	60%	7	0.23	100%	100%
	30-34	4	0.13	50%	25%	2	0.06	100%	100%				
	35-39	1	0.03	100%	100%					2	0.06	100%	100%
	40-49	1	0.03	0%	0%								
	50+	1	0.03	100%	100%					1	0.03	100%	100%
ENGR124	Under 20	4	0.21	75%	75%	3	0.30	67%	33%	4	0.19	50%	25%
	20-24	21	1.09	100%	100%	8	0.79	100%	75%	8	0.39	100%	100%
	25-29	3	0.16	100%	100%	1	0.10	100%	0%	5	0.24	60%	40%
	30-34									3	0.15	100%	100%
	35-39					1	0.10	100%	100%				
	50+	1	0.05	100%	100%					1	0.05	100%	100%
ENGR126	Under 20	7	0.34	86%	71%	12	0.58	83%	58%	3	0.15	100%	100%
	20-24	24	1.17	92%	92%	12	0.58	83%	75%	14	0.68	100%	100%
	25-29	7	0.34	100%	100%	1	0.05	100%	100%	4	0.19	100%	100%
	30-34					1	0.05	100%	100%	3	0.15	100%	100%
	35-39									1	0.05		
	40-49									1	0.05	100%	100%
ENGR152	Under 20	3	0.45	100%	100%	5	0.68	80%	60%	2	0.30	50%	50%
	20-24	32	4.77	91%	75%	18	2.45	83%	50%	24	3.57	79%	71%
	25-29	9	1.34	78%	78%	4	0.54	50%	50%	2	0.30	100%	50%
	30-34									2	0.30	100%	100%
	50+					1	0.14	100%	0%	1	0.15	100%	100%
ENGR154	Under 20	1	0.10	100%	100%	1	0.10	100%	100%	1	0.10	100%	100%
	20-24	17	1.76	88%	82%	9	0.93	100%	89%	10	1.04	86%	86%
	25-29	6	0.62	100%	83%	4	0.41	100%	100%				
	30-34									3	0.31	100%	100%
ENGR156	Under 20	1	0.15	100%	100%					1	0.15	100%	100%
	20-24	21	3.13	95%	86%	5	0.68	100%	100%	6	0.89	100%	100%

Appendix A: Program/Course Demographics by Outcome ENGR

		Academic Year											
		2017-18				2018-19				2019-20			
		Headcou..	FTES	Retention %	Success %	Headcou..	FTES	Retention %	Success %	Headcou..	FTES	Retention %	Success %
ENGR156	25-29	7	1.04	100%	86%	4	0.54	100%	75%	1	0.15		
	30-34	1	0.15	100%	100%					3	0.45	100%	100%
ENGR161	Under 20	1	0.10	100%	100%	3	0.31	100%	100%	3	0.31	67%	33%
	20-24	30	3.11	90%	90%	15	1.55	87%	73%	20	2.07	85%	80%
	25-29	4	0.41	100%	100%	3	0.31	33%	33%	3	0.31	100%	67%
	30-34									3	0.31	100%	100%
ENGR162	Under 20	1	0.11	100%	100%	3	0.32	100%	100%	3	0.32	67%	67%
	20-24	27	2.89	93%	93%	14	1.50	79%	79%	20	2.14	90%	90%
	25-29	4	0.43	100%	100%	3	0.32	33%	33%	3	0.32	100%	100%
	30-34									3	0.32	100%	100%
ENGR170	Under 20	2	0.21	100%	100%	1	0.19	100%	100%	2	0.21	100%	100%
	20-24	19	1.97	89%	89%	18	3.50	100%	94%	14	1.45	100%	100%
	25-29	7	0.73	100%	86%	1	0.19	100%	100%	4	0.41	100%	100%
	30-34	1	0.10	100%	0%	3	0.58	100%	100%	4	0.41	100%	100%
ENGR171	Under 20	2	0.21	100%	100%	1	0.11	100%	100%	2	0.21	100%	100%
	20-24	17	1.82	88%	88%	18	1.92	100%	100%	14	1.50	100%	100%
	25-29	6	0.64	100%	100%	1	0.11	100%	100%	4	0.43	100%	100%
	30-34	1	0.11	100%	100%	3	0.32	100%	100%	4	0.43	100%	100%
ENGR189	20-24	1	0.06	100%	100%								
	25-29	1	0.06	100%	100%								

Appendix A: Program/Course Demographics by Outcome ENVT

		Academic Year											
		2017-18				2018-19				2019-20			
		Headcou..	FTES	Retention %	Success %	Headcou..	FTES	Retention %	Success %	Headcou..	FTES	Retention %	Success %
ENVT101	Hispanic	4	0.41	75%	75%	3	0.31	100%	67%	4	0.41	75%	50%
	White	9	0.93	89%	78%	1	0.10	100%	0%	1	0.10	100%	100%
	Unknown									1	0.10	100%	100%
ENVT150	Asian									1	0.06	100%	0%
	Hispanic	7	0.53	100%	71%	5	0.38	100%	80%	2	0.15	100%	100%
	Native Am	1	0.08	100%	100%	1	0.08	100%	100%				
	White	2	0.15	100%	100%	4	0.30	100%	100%	2	0.15	100%	100%
	Unknown									1	0.08	100%	100%
ENVT152	Black									1	0.10	0%	0%
	Hispanic					2	0.21	100%	100%	8	0.83	80%	80%
	Native Am					1	0.11	100%	100%				
	White					5	0.53	100%	100%	5	0.52	100%	100%
ENVT153	Black									1	0.03	100%	100%
	Hispanic	3	0.09	100%	100%	1	0.03	100%	100%	6	0.17	100%	100%
	Native Am					1	0.03	100%	100%				
	White	6	0.18	100%	100%	2	0.06	100%	100%	3	0.09	100%	100%
ENVT154	Black									2	0.05	50%	50%
	Filipino	1	0.00	100%	0%								
	Hispanic	3	0.12	100%	67%					6	0.36	100%	100%
	Native Am									1	0.06	100%	100%
	White	8	0.42	100%	88%								
ENVT155	Black									2	0.03	100%	100%
	Hispanic	1	0.02	100%	100%	2	0.03	100%	100%	5	0.08	100%	100%
	Native Am					1	0.02	100%	100%				
	White	4	0.06	100%	100%	1	0.02	100%	100%	3	0.03	100%	67%
ENVT156	Asian	2	0.06	100%	100%								
	Black	2	0.06	100%	100%					1	0.03	100%	100%
	Hispanic	6	0.18	100%	100%	8	0.24	100%	100%	9	0.24	89%	78%
	White	38	1.16	100%	100%	28	0.85	100%	100%	7	0.21	100%	86%
	Unknown									1	0.03	100%	100%

Appendix A: Program/Course Demographics by Outcome ENVT

		Academic Year											
		2017-18				2018-19				2019-20			
		Headcou..	FTES	Retention %	Success %	Headcou..	FTES	Retention %	Success %	Headcou..	FTES	Retention %	Success %
ENVT158	Black					2	0.06	100%	100%				
	Hispanic	1	0.03	100%	100%	3	0.09	100%	100%	5	0.15	100%	100%
	Native Am					1	0.03	100%	100%				
	White	7	0.21	86%	86%	1	0.03	100%	100%	5	0.15	100%	100%
ENVT159	Black	1	0.03	100%	0%					2	0.03	100%	50%
	Hispanic	8	0.24	100%	88%	2	0.06	100%	100%	5	0.14	100%	100%
	Native Am					1	0.03	100%	100%				
	White	6	0.18	83%	83%	2	0.06	100%	100%	2	0.06	100%	50%
ENVT160	Black									1	0.06	100%	100%
	Hispanic					3	0.18	100%	100%	7	0.43	86%	86%
	Native Am					1	0.06	100%	100%				
	White					2	0.12	100%	100%	4	0.24	100%	100%
ENVT450	Asian	1	0.02	100%	100%	1	0.02	100%	100%	1	0.02	100%	100%
	Black					1	0.02	100%	100%	2	0.03	100%	100%
	Hispanic	7	0.11	100%	100%	7	0.11	100%	100%	11	0.20	100%	100%
	Native Am	3	0.05	100%	100%	4	0.06	100%	100%	1	0.02	100%	100%
	White	28	0.43	100%	100%	9	0.14	100%	100%	7	0.09	100%	86%
ENVT454	Asian	2	0.03	100%	100%								
	Black	2	0.03	100%	100%					1	0.02	100%	100%
	Filipino					1	0.02	100%	100%				
	Hispanic	10	0.15	100%	100%	9	0.14	100%	100%	11	0.18	100%	100%
	Native Am					1	0.02	100%	100%	1	0.02	100%	100%
	Pac Isl									1	0.02	100%	100%
	White	47	0.72	100%	100%	45	0.69	100%	100%	37	0.56	100%	100%
	Unknown					1	0.02	100%	100%	2	0.03	100%	100%
ENVT455	Black	1	0.00	100%	0%								
	Hispanic	2	0.06	100%	100%								
	Native Am	1	0.03	100%	100%								
	White	8	0.24	100%	100%								
ENVT456	Asian	3	0.05	100%	67%					2	0.03	100%	100%

Appendix A: Program/Course Demographics by Outcome ENVT

		Academic Year											
		2017-18				2018-19				2019-20			
		Headcou..	FTES	Retention %	Success %	Headcou..	FTES	Retention %	Success %	Headcou..	FTES	Retention %	Success %
ENVT456	Black	1	0.02	100%	0%					1	0.02	100%	100%
	Filipino	1	0.02	100%	100%								
	Hispanic	29	0.47	100%	79%	8	0.13	100%	100%	21	0.37	100%	61%
	Native Am	8	0.13	100%	63%	2	0.03	100%	100%	7	0.11	100%	86%
	Pac Isl	2	0.03	100%	50%					2	0.05	100%	33%
	White	90	1.46	100%	61%	3	0.05	100%	67%	92	1.60	100%	73%
	Unknown									1	0.02	100%	100%
ENVT457	Black	1	0.02	100%	100%								
	Hispanic	1	0.02	100%	100%								
	White	8	0.12	100%	100%								

Appendix A: Program/Course Demographics by Outcome ENVT

		Academic Year											
		2017-18				2018-19				2019-20			
		Headcou..	FTES	Retention %	Success %	Headcou..	FTES	Retention %	Success %	Headcou..	FTES	Retention %	Success %
ENVT101	Female	5	0.5	80%	80%								
	Male	8	0.8	88%	75%	4	0.4	100%	50%	6	0.6	83%	67%
ENVT150	Female	2	0.2	100%	100%	4	0.3	100%	100%				
	Male	8	0.6	100%	75%	6	0.5	100%	83%	6	0.4	100%	83%
ENVT152	Female					4	0.4	100%	100%	2	0.2	50%	50%
	Male					4	0.4	100%	100%	12	1.2	89%	89%
ENVT153	Female	5	0.2	100%	100%								
	Male	4	0.1	100%	100%	4	0.1	100%	100%	10	0.3	100%	100%
ENVT154	Female	6	0.2	100%	67%					1	0.0	0%	0%
	Male	6	0.3	100%	83%					8	0.5	100%	100%
ENVT155	Female	3	0.0	100%	100%	1	0.0	100%	100%	2	0.0	100%	50%
	Male	2	0.0	100%	100%	3	0.0	100%	100%	8	0.1	100%	100%
ENVT156	Female	6	0.2	100%	100%	6	0.2	100%	100%	7	0.2	86%	71%
	Male	42	1.3	100%	100%	30	0.9	100%	100%	11	0.3	100%	91%
ENVT158	Female	3	0.1	100%	100%	2	0.1	100%	100%	2	0.1	100%	100%
	Male	5	0.2	80%	80%	5	0.2	100%	100%	8	0.2	100%	100%
ENVT159	Female	5	0.2	100%	100%	1	0.0	100%	100%	1	0.0	100%	0%
	Male	10	0.3	90%	70%	4	0.1	100%	100%	8	0.2	100%	88%
ENVT160	Female					2	0.1	100%	100%	3	0.2	67%	67%
	Male					4	0.2	100%	100%	9	0.5	100%	100%
ENVT450	Female	9	0.1	100%	100%	6	0.1	100%	100%	6	0.1	100%	100%
	Male	30	0.5	100%	100%	16	0.2	100%	100%	16	0.2	100%	94%
ENVT454	Female	4	0.1	100%	100%	4	0.1	100%	100%	4	0.1	100%	100%
	Male	57	0.9	100%	100%	53	0.8	100%	100%	49	0.8	100%	100%
ENVT455	Female	2	0.1	100%	100%								
	Male	10	0.3	100%	90%								
ENVT456	Female	5	0.1	100%	40%	2	0.0	100%	100%	7	0.1	100%	86%
	Male	129	2.1	100%	66%	11	0.2	100%	91%	118	2.1	100%	70%
	Unknown									1	0.0	100%	100%
ENVT457	Female	1	0.0	100%	100%								

Appendix A: Program/Course Demographics by Outcome ENVT

		Academic Year											
		2017-18				2018-19				2019-20			
		Headcou..	FTES	Retention %	Success %	Headcou..	FTES	Retention %	Success %	Headcou..	FTES	Retention %	Success %
ENVT457	Male	9	0.1	100%	100%								

Appendix A: Program/Course Demographics by Outcome ENVT

		Academic Year											
		2017-18				2018-19				2019-20			
		Headcou..	FTES	Retention %	Success %	Headcou..	FTES	Retention %	Success %	Headcou..	FTES	Retention %	Success %
ENVT101	First Time	2	0.21	100%	100%					1	0.10	100%	100%
	First Time Transfer	2	0.21	50%	50%	1	0.10	100%	0%				
	Continuing	6	0.62	83%	83%	3	0.31	100%	67%	4	0.41	75%	75%
	Returning	3	0.31	100%	67%					1	0.10	100%	0%
ENVT150	First Time					1	0.08	100%	100%	1	0.08	100%	100%
	First Time Transfer	3	0.23	100%	100%	1	0.08	100%	100%	1	0.08	100%	100%
	Continuing	3	0.23	100%	67%	5	0.38	100%	80%	2	0.15	100%	100%
	Returning	4	0.30	100%	75%	3	0.23	100%	100%	2	0.13	100%	50%
ENVT152	First Time									1	0.10		
	Continuing					7	0.75	100%	100%	9	0.93	86%	86%
	Returning					1	0.11	100%	100%	4	0.41	75%	75%
ENVT153	First Time					2	0.06	100%	100%				
	First Time Transfer	1	0.03	100%	100%					1	0.03	100%	100%
	Continuing	3	0.09	100%	100%	1	0.03	100%	100%	7	0.20	100%	100%
	Returning	5	0.15	100%	100%	1	0.03	100%	100%	2	0.06	100%	100%
ENVT154	First Time	1	0.06	100%	100%								
	First Time Transfer	1	0.06	100%	100%								
	Continuing	9	0.42	100%	78%					8	0.41	88%	88%
	Returning	1	0.00	100%	0%					1	0.06	100%	100%
ENVT155	First Time Transfer	1	0.02	100%	100%								
	Continuing	2	0.03	100%	100%	3	0.05	100%	100%	6	0.09	100%	100%
	Returning	2	0.03	100%	100%	1	0.02	100%	100%	4	0.05	100%	75%
ENVT156	First Time									1	0.03	100%	0%
	First Time Transfer	16	0.49	100%	100%	10	0.30	100%	100%				
	Continuing	24	0.72	100%	100%	21	0.64	100%	100%	16	0.49	100%	94%
	Returning	8	0.24	100%	100%	5	0.15	100%	100%	1	0.00	0%	0%
ENVT158	First Time	1	0.03	100%	100%								
	First Time Transfer					2	0.06	100%	100%				
	Continuing	7	0.21	86%	86%	5	0.15	100%	100%	7	0.21	100%	100%
	Returning									3	0.09	100%	100%

Appendix A: Program/Course Demographics by Outcome ENVT

		Academic Year											
		2017-18				2018-19				2019-20			
		Headcou..	FTES	Retention %	Success %	Headcou..	FTES	Retention %	Success %	Headcou..	FTES	Retention %	Success %
ENVT159	Continuing	10	0.30	100%	90%	4	0.12	100%	100%	7	0.17	100%	71%
	Returning	5	0.15	80%	60%	1	0.03	100%	100%	2	0.06	100%	100%
ENVT160	Continuing					6	0.37	100%	100%	8	0.49	100%	100%
	Returning									4	0.24	75%	75%
ENVT450	First Time Transfer	5	0.08	100%	100%	1	0.02	100%	100%				
	Continuing	12	0.18	100%	100%	13	0.20	100%	100%	18	0.29	100%	95%
	Returning	22	0.34	100%	100%	8	0.12	100%	100%	4	0.06	100%	100%
ENVT454	First Time	2	0.03	100%	100%	1	0.02	100%	100%				
	First Time Transfer	21	0.32	100%	100%	23	0.35	100%	100%	25	0.38	100%	100%
	Continuing	29	0.44	100%	100%	20	0.30	100%	100%	17	0.27	100%	100%
	Returning	8	0.12	100%	100%	13	0.20	100%	100%	11	0.17	100%	100%
	Special Admit	1	0.02	100%	100%								
ENVT455	Continuing	2	0.06	100%	100%								
	Returning	10	0.27	100%	90%								
ENVT456	First Time	1	0.02	100%	0%					4	0.06	100%	75%
	First Time Transfer	1	0.02	100%	0%					9	0.15	100%	78%
	Continuing	98	1.59	100%	64%	12	0.19	100%	92%	34	0.65	100%	68%
	Returning	34	0.55	100%	71%	1	0.02	100%	100%	79	1.34	100%	72%
ENVT457	First Time Transfer	3	0.05	100%	100%								
	Continuing	2	0.03	100%	100%								
	Returning	5	0.08	100%	100%								

Appendix B: Major match detail

--If a student has the same program of study and major as the award earned they will be a 'Major Match'. If not they will be a 'Major Split'.

--Headcount & Percentages are the students who are a major match/split for a specific award.

--Data is sorted by program/major of the earned award.

Major Match	Program Desc	Degree	Degree Major	Student Major	Degree Desc (group)	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
						Academic Year Graduation Desc					
Match	Enginee..	AA	Engineering	Engineering	Associate in Arts (A)	7	10	4	12	11	8
		Total				**7**	**10**	**4**	**12**	**11**	**8**
	Total					**7**	**10**	**4**	**12**	**11**	**8**
Split	Enginee..	AA	Engineering	Accounting	Associate in Arts (A)						1
				Architectural Drafting	Associate in Arts (A)		1				
				Biology	Associate in Arts (A)				1		
				Civil Engineering	Associate in Arts (A)	1	1		2		
				Computer Science	Associate in Arts (A)				1	1	
				Electronic Engineering Tech	Associate in Arts (A)	1		1	1	1	
				Engineering Technology	Associate in Arts (A)			1			
				Engr Tech: Mechatronics	Associate in Arts (A)				1		
				Management	Associate in Arts (A)						1
				Mathematics: Comp Sci Emph..	Associate in Arts (A)						1
				Psychology	Associate in Arts (A)	1					
				Registered Nursing	Associate in Arts (A)			1			
				Viticulture	Associate in Arts (A)				1		
		Total				**3**	**2**	**3**	**7**	**2**	**3**
	Total					**3**	**2**	**3**	**7**	**2**	**3**
Grand Total						**10**	**12**	**7**	**19**	**13**	**11**

Term
Multiple values

Term
Multiple values

Program
ENGR

Department
Null

Program
Engineering

Term
Multiple values

Program
ENGR

Discipline
ENGR

Comprehensive Program Review (CPR) Learning Outcomes Assessment Data

This document contains the data from the last 6 years as reported to Institutional Effectiveness via eLumen. The packet contains charts and tables that indicate outcome performance by Course Learning Outcomes (CLO), Program Learning Outcomes (PLO), and Institutional Learning Outcomes (ILO).

Sample Question from the CPR:

What are your program student learning outcomes? Have each of these been assessed since the last comprehensive program review?

Items to look for:
1. Courses with little to no completed assessments
2. Table Data in red that indicates performance that was below the 70% benchmark
3. Improvement plans that have suggestions for improvements..

1. Historical PLO Performance Chart- This is a chart showing the PLO percent and the count of students that met standards by term.

2.Historical PLO Performance Table- This is a table showing the overal PLO performance over the last 6 academic years, including percent and numbers of students meeting standards.

3. PLO Performance by Demographic- This chart shows the PLO performance reported by gender, ethnicity, first-gen, etc.

4. PLO Performance by Demographic Chart- This is the table version of the chart but also includes the counts of students reported.

5. Historical CLO Performance Chart - This is a chart showing the CLO percent met and the count of students that met standards by term.

6. Historical CLO Performance Table- This is a chart of the table above.

7. Historical Course Performance- This is SLO assessment by course, including percent and number of students that met standards.

8. ILO Performance Table- This is the ILO performance of the program for the past 6 academic years.

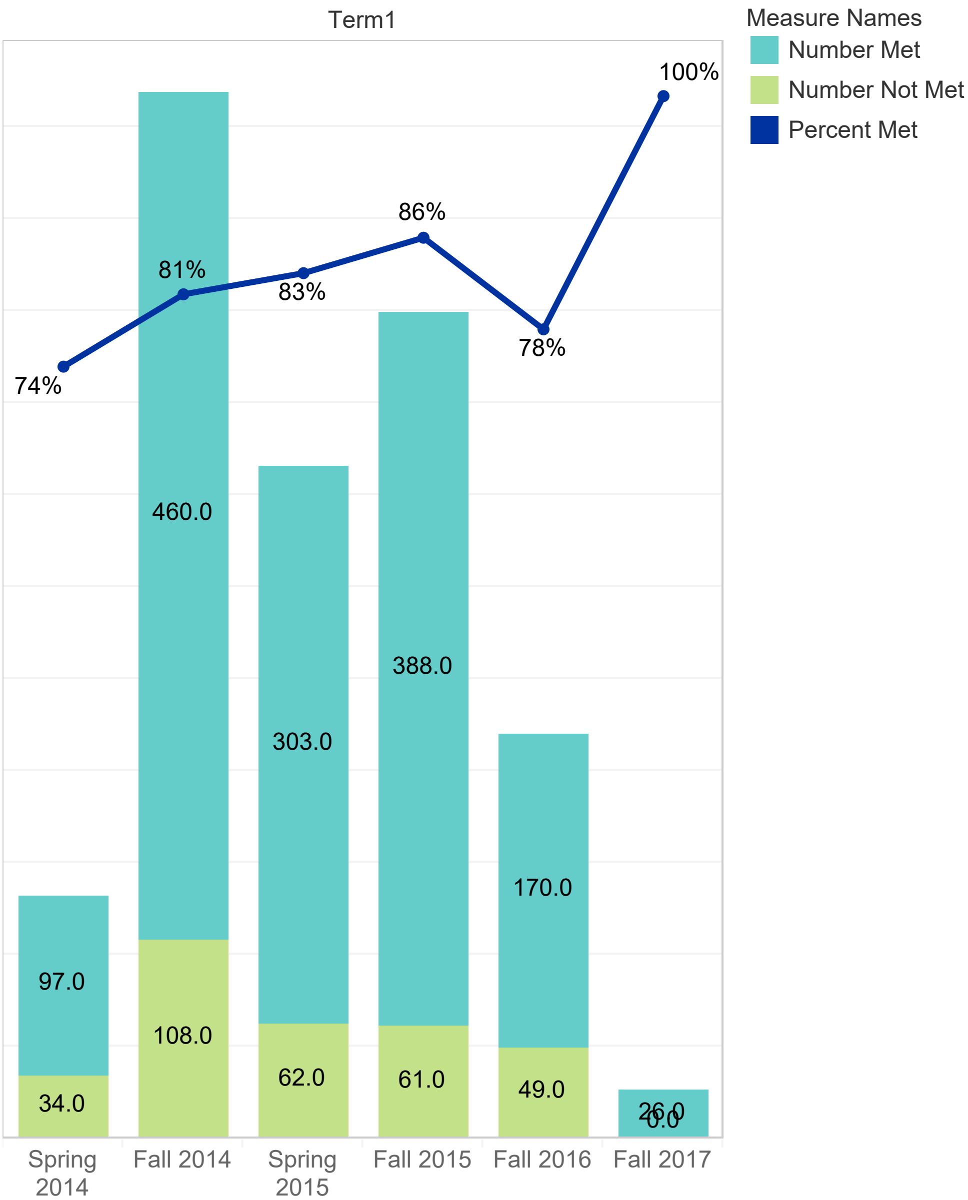
9. ILO Performance Chart- This is the ILO performance of the program for the past 6 academic years in a table that includes the number of courses that are connected to each ILO.

10. Historical Associations- CLOs and ILOs/PLOs- These are the CLO and ILO associations.

11. Historical Associations ILO/PLO- These are the Course and ILO associations.

12. Course Improvement Plans- These are all the course improvement plans that have been reported for the last 6 years. The terms and courses that do not have improvement plans reported have been filtered out.

1. Historical PLO Performance Chart- This is a chart showing the PLO percent and the count of students that met standards by term.

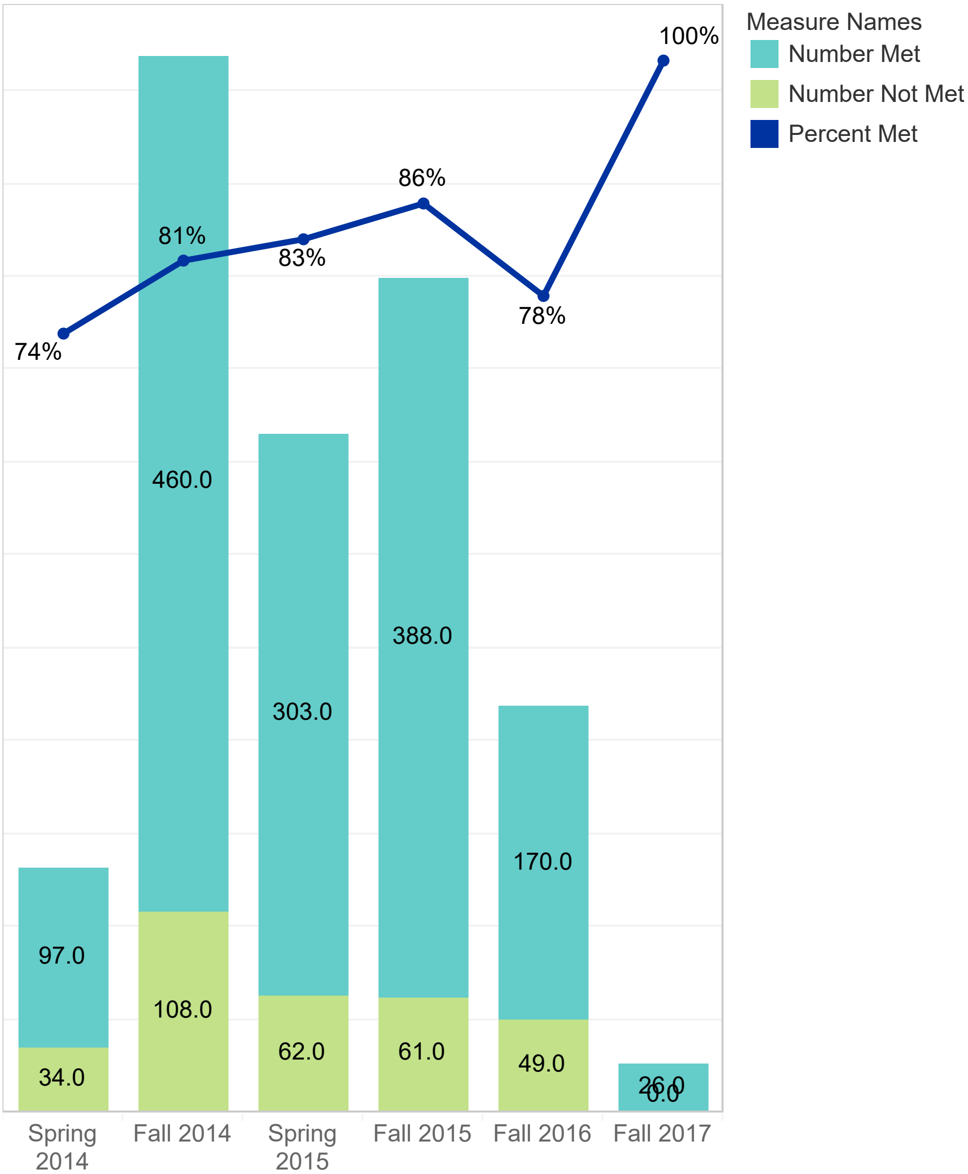


2.Historical PLO Performance Table- This is a table showing the overal PLO performance over the last 6 academic years, including percent and numbers of students meeting standards.

3. PLO Performance by Demographic- This chart shows the PLO performance reported by gender, ethnicity, first-gen, etc.

4. PLO Performance by Demographic Chart- This is the table version of the chart but also includes the counts of students reported.

5. Historical CLO Performance Chart - This is a chart showing the CLO percent met and the count of students that met standards by term.



6. Historical CLO Performance Table- This is a chart of the table above.

			Number Met	Number Not Met	Percent Met
ENGR100	ENGR1	Explain the basic differences between the various engineering branches, and how these branches relate to fields in science.	34.0	13.0	72%
		Total	34.0	13.0	72%
	ENGR2	Describe the engineering design process; i.e., the steps of problem solving.	20.0	0.0	100%
		Total	20.0	0.0	100%
	ENGR3	Describe academic requirements, attitudes, and skills that lead to success in the study of science and of engineering.	90.0	23.0	80%
		Total	90.0	23.0	80%
	ENGR4	Create a schedule of courses for their next 2-4 academic terms at AHC (and/or transfer institution).	147.0	31.0	83%
		Total	147.0	31.0	83%
	ENGR5	Explain in oral and written forms how a piece of technology works.	126.0	45.0	74%
		Total	126.0	45.0	74%
	Total		417.0	112.0	79%
ENGR124	ENGR1	Input a set of data in Excel, and perform mathematical operations on it.	31.0	0.0	100%
		Total	31.0	0.0	100%
	ENGR2	Plot a set of data in Excel, format and display it in a professional manner with appropriate annotations and graphics, and integrate it into a Word document.	21.0	0.0	100%
		Total	21.0	0.0	100%
	ENGR3	Sort data, apply conditional formatting and utilize an Excel spreadsheet as a database.	21.0	0.0	100%

6. Historical CLO Performance Table- This is a chart of the table above.

			Number Met	Number Not Met	Percent Met
ENGR124	ENGR3	Total	21.0	0.0	100%
	ENGR4	Solve algebraic equations and systems of linear equations.	26.0	6.0	81%
		Total	26.0	6.0	81%
	ENGR5	Create a spreadsheet in Excel to perform numerical differentiation and integration.	8.0	3.0	73%
		Total	8.0	3.0	73%
	ENGR6	Solve science and engineering problems using Excelâ€™s engineering and statistical functions.	20.0	1.0	95%
		Total	20.0	1.0	95%
	Total		127.0	10.0	93%
ENGR126	ENGR1	Operate within the MATLAB environment to utilize scalar, vector, and matrix functions.	16.0	0.0	100%
		Total	16.0	0.0	100%
	ENGR2	Program script files in MATLAB to solve numerical problems and present results in a professional manner.	14.0	2.0	88%
		Total	14.0	2.0	88%
	ENGR3	Import data sets into MATLAB and create 2 dimensional and 3 dimensional plots of data sets.	15.0	1.0	94%
		Total	15.0	1.0	94%
	ENGR4	Create m-files in MATLAB.	14.0	2.0	88%
		Total	14.0	2.0	88%

6. Historical CLO Performance Table- This is a chart of the table above.

			Number Met	Number Not Met	Percent Met
ENGR126	ENGR5	Perform curve fitting and interpolation on data sets.	15.0	1.0	94%
		Total	15.0	1.0	94%
	Total		74.0	6.0	93%
ENGR152	ENGR1	Generate appropriate Free Body Diagrams.	41.0	30.0	58%
		Total	41.0	30.0	58%
	ENGR2	Formulate and solve problems involving statically applied forces in two and three dimensions.	32.0	19.0	63%
		Total	32.0	19.0	63%
	ENGR3	Analyze trusses, frames and simple machines.	42.0	9.0	82%
		Total	42.0	9.0	82%
	ENGR4	Locate mathematically the centroids of areas.	54.0	17.0	76%
		Total	54.0	17.0	76%
	ENGR5	Calculate internal forces and bending moments in beam systems.	57.0	14.0	80%
		Total	57.0	14.0	80%
	Total		226.0	89.0	72%
ENGR154	ENGR1	Formulate and solve problems involving the kinematics of particles in 2- and 3-dimensions, including relative and constrained motion problems.	8.0	4.0	67%
		Total	8.0	4.0	67%

6. Historical CLO Performance Table- This is a chart of the table above.

			Number Met	Number Not Met	Percent Met
ENGR154	ENGR2	Formulate and solve problems involving the kinetics of particles in 2- and 3-dimensions, using Newtonâ€™s 2nd Law, energy and impulse-momentum methods.	11.0	1.0	92%
		Total	11.0	1.0	92%
	ENGR3	Formulate and solve problems involving the planar kinematics of rigid bodies.	5.0	7.0	42%
		Total	5.0	7.0	42%
	ENGR4	Describe analytically the rotational motion of rigid bodies.	9.0	3.0	75%
		Total	9.0	3.0	75%
	Total		33.0	15.0	69%
ENGR156	ENGR1	Determine the internal loads (forces and moments) in each structural member of an engineering system, given an external loading condition.	6.0	1.0	86%
		Total	6.0	1.0	86%
	ENGR2	Identify the applicable theory, and apply the appropriate equations to calculate the internal stresses, strains and/or displacements in axial members, torsion members, beam..	7.0	0.0	100%
		Total	7.0	0.0	100%
	ENGR3	Determine the stresses, strains and displacements in members subjected to combined loading.	6.0	1.0	86%
		Total	6.0	1.0	86%
	ENGR4	Perform coordinate transformations of stresses and strains at a point, including using Mohrâ€™s Circle.	5.0	2.0	71%
		Total	5.0	2.0	71%
	ENGR5	Determine if a structural system meets its design specifications, and/or determine how the system will fail, given or having calculated the stresses, strains and displa..	5.0	2.0	71%

6. Historical CLO Performance Table- This is a chart of the table above.

			Number Met	Number Not Met	Percent Met
ENGR156	ENGR5				
		Total	5.0	2.0	71%
	ENGR6	Determine the buckling loads of various columns.	6.0	1.0	86%
		Total	6.0	1.0	86%
	Total		35.0	7.0	83%
ENGR161	ENGR1	Distinguish between the various types of atomic bonds.	17.0	8.0	68%
		Total	17.0	8.0	68%
	ENGR2	Solve diffusion problems.	21.0	4.0	84%
		Total	21.0	4.0	84%
	ENGR3	Solve problems relating to the elastic and plastic deformation of materials.	16.0	9.0	64%
		Total	16.0	9.0	64%
	ENGR4	Solve problems relating to basic fracture and fatigue.	17.0	8.0	68%
		Total	17.0	8.0	68%
	ENGR5	Associate mechanical properties of metals with their structure, defects and mechanical and thermal processing.	13.0	12.0	52%
		Total	13.0	12.0	52%
	ENGR6	Use phase diagrams to determine composition.	22.0	3.0	88%
		Total	22.0	3.0	88%

6. Historical CLO Performance Table- This is a chart of the table above.

			Number Met	Number Not Met	Percent Met
ENGR161	ENGR7	Describe the role that corrosion plays in the degradation of materials.	23.0	2.0	92%
		Total	23.0	2.0	92%
	ENGR8	Compare mechanical and electrical behaviors of metals, ceramics and semiconductors	13.0	0.0	100%
		Total	13.0	0.0	100%
	ENGR9	Describe different techniques for forming and shaping metals and ceramics.	29.0	0.0	100%
		Total	29.0	0.0	100%
	Total		171.0	46.0	79%
ENGR162	ENGR1	Construct models of metallic bonds and calculate their geometric properties.	22.0	1.0	96%
		Total	22.0	1.0	96%
	ENGR2	Prepare and perform tensile tests on metals and polymers.	23.0	0.0	100%
		Total	23.0	0.0	100%
	ENGR3	Analyze tensile test stress-strain data.	21.0	2.0	91%
		Total	21.0	2.0	91%
	ENGR4	Perform Rockwell hardness tests on metals.	23.0	0.0	100%
		Total	23.0	0.0	100%
	ENGR6	Interpret microstructure from microscopic images.	22.0	1.0	96%

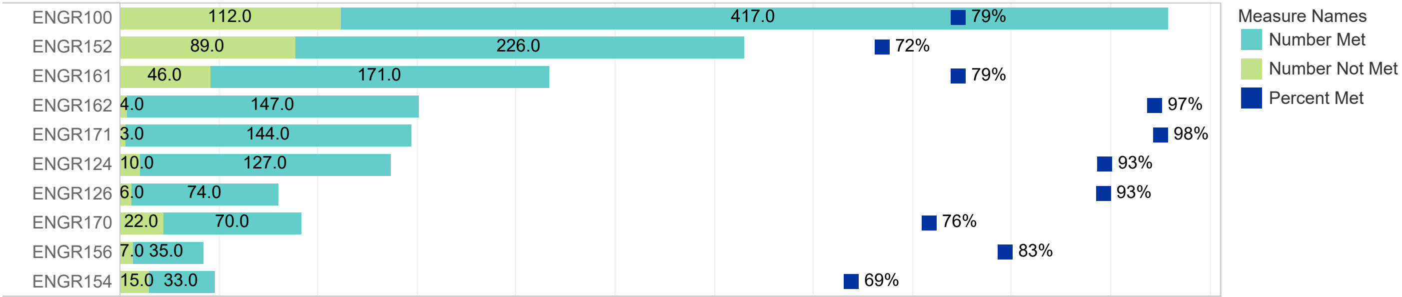
6. Historical CLO Performance Table- This is a chart of the table above.

			Number Met	Number Not Met	Percent Met
ENGR162	ENGR6	Total	22.0	1.0	96%
	ENGR7	Gather and interpret temperature (cooling curve) data to generate phase diagrams for metal alloys.	23.0	0.0	100%
		Total	23.0	0.0	100%
	ENGR11	Gather and analyze test data and images using computers.	13.0	0.0	100%
		Total	13.0	0.0	100%
	Total		147.0	4.0	97%
ENGR170	ENGR1	Analyze resistive circuits utilizing basic techniques of circuit analysis and network theorems.	18.0	5.0	78%
		Total	18.0	5.0	78%
	ENGR2	Analyze op-amp circuits.	18.0	5.0	78%
		Total	18.0	5.0	78%
	ENGR4	Determine natural and forced responses of second-order RLC circuits.	17.0	6.0	74%
		Total	17.0	6.0	74%
	ENGR5	Analyze steady-state AC circuits, including power calculations, using complex notation and phasors.	17.0	6.0	74%
		Total	17.0	6.0	74%
	Total		70.0	22.0	76%
ENGR171	ENGR1	Analyze circuits using standard circuit analysis techniques.	20.0	1.0	95%

6. Historical CLO Performance Table- This is a chart of the table above.

			Number Met	Number Not Met	Percent Met
ENGR171	ENGR1				
		Total	20.0	1.0	95%
	ENGR2	Build circuits on breadboards with resistive, capacitive and inductive elements.	21.0	0.0	100%
		Total	21.0	0.0	100%
	ENGR3	Generate electric signals using DC voltage sources and function generators.	21.0	0.0	100%
		Total	21.0	0.0	100%
	ENGR4	Measure voltage, current, and resistance using various meters.	21.0	0.0	100%
		Total	21.0	0.0	100%
	ENGR5	Measure voltage, frequency, and phase using an oscilloscope.	19.0	2.0	90%
		Total	19.0	2.0	90%
	ENGR6	Record results and analyze and evaluate data.	21.0	0.0	100%
		Total	21.0	0.0	100%
	ENGR7	Use computer tools to analyze/design and build a circuit system.	21.0	0.0	100%
		Total	21.0	0.0	100%
	Total		144.0	3.0	98%

7. Historical Course Performance- This is SLO assessment by course, including percent and number of students that met standards.



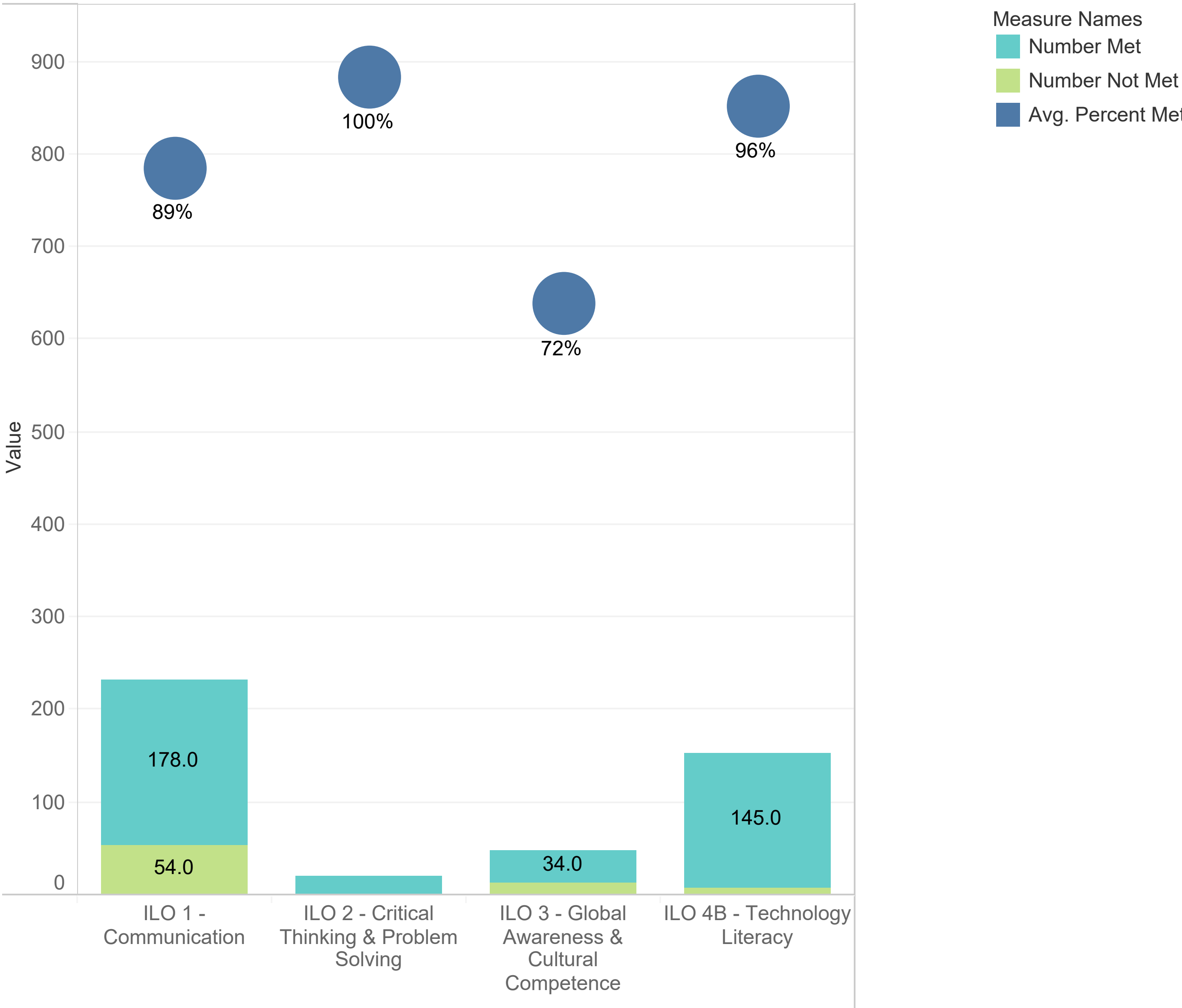
8. ILO Performance Table- This is the ILO performance of the program for the past 6 academic years.

	# of Connected Courses	Avg. Percent Met
ILO 1 - Communication: Communicate effectively using verbal, visual and written language with clarity and purpose in workplace, community and academic contexts.	3.0	89%
ILO 2 - Critical Thinking & Problem Solving: Explore issues through various information sources; evaluate the credibility and significance of both the information and the source to arrive at a reasoned conclusion.	1.0	100%
ILO 3 - Global Awareness & Cultural Competence: Respectfully interact with individuals of diverse perspectives, beliefs and values being mindful of the limitation of your own cultural framework.	1.0	72%
ILO 4B - Technology Literacy: Proficiency in a technology and the ability to choose the appropriate tools.	4.0	96%
ILO 5 - Quantitative Literacy: Use mathematical concepts and models to analyze and solve real life issues or problems.	8.0	77%
ILO 6 - Scientific Literacy: Use scientific knowledge and methodologies to assess potential solutions to real-life challenges.	3.0	92%
ILO 7 - Personal Responsibility & Development: Take the initiative and responsibility to assess your own actions with regard to physical wellness, learning opportunities, career planning, creative contribution to the community and ethical integrity in the	1.0	77%

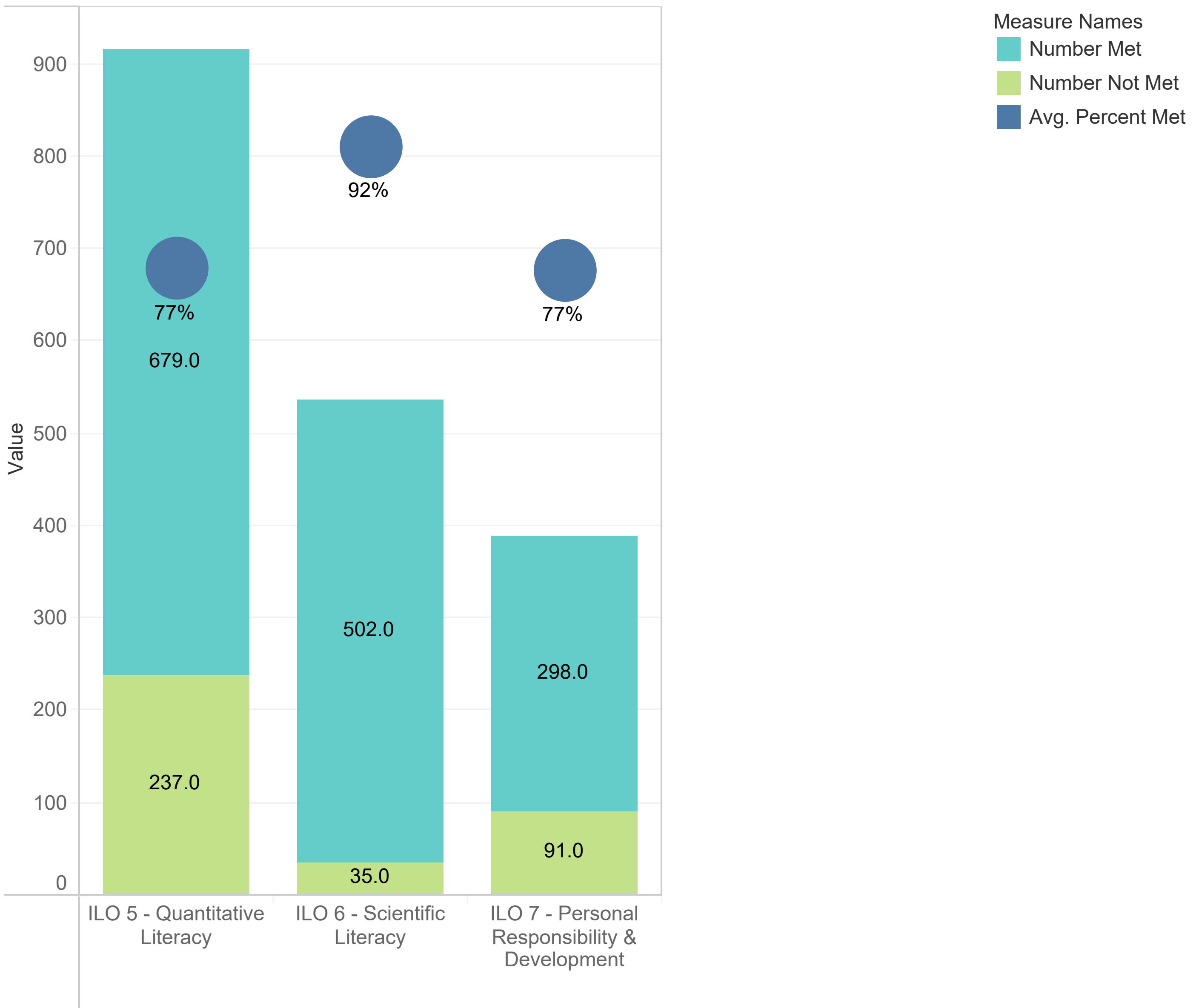
8. ILO Performance Table- This is the ILO performance of the program for the past 6 academic years.

	Number Met	Number Not Met
ILO 1 - Communication: Communicate effectively using verbal, visual and written language with clarity and purpose in workplace, community and academic contexts.	178.0	54.0
ILO 2 - Critical Thinking & Problem Solving: Explore issues through various information sources; evaluate the credibility and significance of both the information and the source to arrive at a reasoned conclusion.	20.0	0.0
ILO 3 - Global Awareness & Cultural Competence: Respectfully interact with individuals of diverse perspectives, beliefs and values being mindful of the limitation of your own cultural framework.	34.0	13.0
ILO 4B - Technology Literacy: Proficiency in a technology and the ability to choose the appropriate tools.	145.0	8.0
ILO 5 - Quantitative Literacy: Use mathematical concepts and models to analyze and solve real life issues or problems.	679.0	237.0
ILO 6 - Scientific Literacy: Use scientific knowledge and methodologies to assess potential solutions to real-life challenges.	502.0	35.0
ILO 7 - Personal Responsibility & Development: Take the initiative and responsibility to assess your own actions with regard to physical wellness, learning opportunities, career planning, creative contribution to the community and ethical integrity in the	298.0	91.0

9. ILO Performance Chart- This is the ILO performance of the program for the past 6 academic years in a table that includes the number of courses that are connected to each ILO.



9. ILO Performance Chart- This is the ILO performance of the program for the past 6 academic years in a table that includes the number of courses that are connected to each ILO.



10. Historical Associations- CLOs and ILOs/PLOs- These are the CLO and ILO associations.

					Null	Outcome ERP / Outcome			ILO 1	ILO 2	ILO 3
		ENGR PSLO - Apply fundamental concepts of mathematics (through calculus), science and engineering.	ENGR PSLO - Communicate effectively both orally and in writing, using symbols, graphics and numbers.	ENGR PSLO - Conduct experiments and analyze and interpret data.	ENGR PSLO - Identify, formulate and solve basic engineering problems.	ENGR PSLO - Make basic design decisions concerning appropriate-level engineering problems.	ENGR PSLO - Recognize the need for, and an ability to engage in, lifelong learning.	ENGR PSLO - Use techniques, skills and modern engineering tools necessary in engineering education and practice.	Communication: Communicate effectively using verbal, visual and written language with clarity and purpose in workplace, community and academic contexts.	Critical Thinking & Problem Solving: Explore issues through various information sources; evaluate the credibility and significance of both the information and the source to arrive at a reasoned conclusion.	Global Awareness & Cultural Competence: Respectfully interact with individuals of diverse perspectives, beliefs and values being mindful of the limitation of your own cultural framework.
ENGR100	academic terms at AHC (and/or transfer institution). 4 Create a schedule of courses for their next 2						X				
	Create a schedule of courses for their next 2 4 academic terms at AHC (and/or transfer institution).										
	Describe academic requirements, attitudes, and skills that lead to success in the study of science and of engineering.						X				
	Describe the engineering design process; i.e., the steps of problem solving.					X				X	
	Explain in oral and written forms how a piece of technology works.		X						X		
	Explain the basic differences between the various engineering branches, and how these branches relate to fi..						X				X
ENGR124	Create a spreadsheet in Excel to perform numerical differentiation and integration.	X									
	Input a set of data in Excel, and perform mathematical operations on it.							X			
	Plot a set of data in Excel, format and display it in a professional manner with appropriate annotations and grap..		X						X		
	Solve algebraic equations and systems of linear equations.	X									
	Solve science and engineering problems using Excel's engineering and statistical functions.			X							
	Sort data, apply conditional formatting and utilize an Excel spreadsheet as a database.							X			
ENGR126	Create m files in MATLAB.							X			
	dimensional plots of data sets. dimensional and 3 Import data sets into MATLAB and create 2		X								
	Import data sets into MATLAB and create 2 dimensional and 3 dimensional plots of data sets.								X		
	Operate within the MATLAB environment to utilize scalar, vector, and matrix functions.							X			
	Perform curve fitting and interpolation on data sets.	X									
	Program script files in MATLAB to solve numerical problems and present results in a professional manner.	X									
	Solve ODE problems utilizing MATLAB's built in solvers.	X									
ENGR152	Analyze trusses, frames and simple machines.				X						
	Calculate cable loads and fluid forces.				X						
	Calculate internal forces and bending moments in beam systems.				X						
	Formulate and solve problems involving statically applied forces in two and three dimensions.				X						
	Generate appropriate Free Body Diagrams.	X									
	Locate mathematically the centroids of areas.	X									
ENGR154	Describe analytically the rotational motion of rigid bodies.				X						
	dimensions, including relative and constrained motion problems. and 3 Formulate and solve problems involving ..				X						
	Formulate and solve problems involving the kinematics of particles in 2 and 3 dimensions, including relative and con..										
	Formulate and solve problems involving the kinetics of particles in 2 and 3 dimensions, using Newton's 2nd Law, ..										
	Formulate and solve problems involving the planar kinematics of rigid bodies.				X						
	nd Law, energy and impulse momentum methods. dimensions, using Newton's 2 and 3 Formulate and solve..				X						
ENGR156	Determine if a structural system meets its design specifications, and/or determine how the system will fail, gi..				X						
	Determine the buckling loads of various columns.				X						
	Determine the internal loads (forces and moments) in each structural member of an engineering system, given an exte..				X						
	Determine the stresses, strains and displacements in members subjected to combined loading.				X						
	Identify the applicable theory, and apply the appropriate equations to calculate the internal stresses, strains and/or ..				X						
	Perform coordinate transformations of stresses and strains at a point, including using Mohr's Circle.				X						
ENGR161	Associate mechanical properties of metals with their structure, defects and mechanical and thermal processing.				X						
	Compare mechanical and electrical behaviors of metals, ceramics and semiconductors				X						
	Describe different techniques for forming and shaping metals and ceramics.				X						
	Describe the role that corrosion plays in the degradation of materials.	X									
	Distinguish between the various types of atomic bonds.	X									
	Solve diffusion problems.				X						
	Solve problems relating to basic fracture and fatigue.				X						
	Solve problems relating to the elastic and plastic deformation of materials.				X						
	Use phase diagrams to determine composition.				X						
ENGR162	Analyze tensile test stress strain data.			X							
	Construct models of metallic bonds and calculate their geometric properties.	X									
	Gather and analyze test data and images using computers.							X			

10. Historical Associations- CLOs and ILOs/PLOs- These are the CLO and ILO associations.

		Outcome ERP / Outcome			
		ILO 4B	ILO 5	ILO 6	ILO 7
		Technology Literacy: Proficiency in a technology and the ability to choose the appropriate tools.	Quantitative Literacy: Use mathematical concepts and models to analyze and solve real life issues or problems.	Scientific Literacy: Use scientific knowledge and methodologies to assess potential solutions to real-life challenges.	Personal Responsibility & Development: Take the initiative and responsibility to assess your own actions with regard to physical wellness, learning opportunities, career planning, creative contribution to the community and ethical integrity in the
ENGR100	academic terms at AHC (and/or transfer institution). 4 Create a schedule of courses for their next 2				
	Create a schedule of courses for their next 2 4 academic terms at AHC (and/or transfer institution).				X
	Describe academic requirements, attitudes, and skills that lead to success in the study of science and of engineering.				X
	Describe the engineering design process; i.e., the steps of problem solving.				
	Explain in oral and written forms how a piece of technology works.				
	Explain the basic differences between the various engineering branches, and how these branches relate to fi..				
ENGR124	Create a spreadsheet in Excel to perform numerical differentiation and integration.		X		
	Input a set of data in Excel, and perform mathematical operations on it.	X			
	Plot a set of data in Excel, format and display it in a professional manner with appropriate annotations and grap..				
	Solve algebraic equations and systems of linear equations.		X		
	Solve science and engineering problems using Excel's engineering and statistical functions.			X	
	Sort data, apply conditional formatting and utilize an Excel spreadsheet as a database.	X			
ENGR126	Create m files in MATLAB.	X			
	dimensional plots of data sets. dimensional and 3 Import data sets into MATLAB and create 2				
	Import data sets into MATLAB and create 2 dimensional and 3 dimensional plots of data sets.				
	Operate within the MATLAB environment to utilize scalar, vector, and matrix functions.	X			
	Perform curve fitting and interpolation on data sets.				
	Program script files in MATLAB to solve numerical problems and present results in a professional manner.		X		
	Solve ODE problems utilizing MATLAB's built in solvers.		X		
ENGR152	Analyze trusses, frames and simple machines.		X		
	Calculate cable loads and fluid forces.		X		
	Calculate internal forces and bending moments in beam systems.		X		
	Formulate and solve problems involving statically applied forces in two and three dimensions.		X		
	Generate appropriate Free Body Diagrams.		X		
	Locate mathematically the centroids of areas.		X		
ENGR154	Describe analytically the rotational motion of rigid bodies.		X		
	dimensions, including relative and constrained motion problems. and 3 Formulate and solve problems involving ..				
	Formulate and solve problems involving the kinematics of particles in 2 and 3 dimensions, including relative and con..		X		
	Formulate and solve problems involving the kinetics of particles in 2 and 3 dimensions, using Newton's 2nd Law, ..		X		
	Formulate and solve problems involving the planar kinematics of rigid bodies.		X		
	nd Law, energy and impulse momentum methods. dimensions, using Newton's 2 and 3 Formulate and solve..				
ENGR156	Determine if a structural system meets its design specifications, and/or determine how the system will fail, gi..		X		
	Determine the buckling loads of various columns.		X		
	Determine the internal loads (forces and moments) in each structural member of an engineering system, given an exte..		X		
	Determine the stresses, strains and displacements in members subjected to combined loading.		X		
	Identify the applicable theory, and apply the appropriate equations to calculate the internal stresses, strains and/or ..		X		
	Perform coordinate transformations of stresses and strains at a point, including using Mohr's Circle.		X		
ENGR161	Associate mechanical properties of metals with their structure, defects and mechanical and thermal processing.			X	
	Compare mechanical and electrical behaviors of metals, ceramics and semiconductors			X	
	Describe different techniques for forming and shaping metals and ceramics.			X	
	Describe the role that corrosion plays in the degradation of materials.			X	
	Distinguish between the various types of atomic bonds.			X	
	Solve diffusion problems.		X		
	Solve problems relating to basic fracture and fatigue.		X		
	Solve problems relating to the elastic and plastic deformation of materials.		X		
	Use phase diagrams to determine composition.		X		
ENGR162	Analyze tensile test stress strain data.			X	
	Construct models of metallic bonds and calculate their geometric properties.			X	
	Gather and analyze test data and images using computers.	X			

10. Historical Associations- CLOs and ILOs/PLOs- These are the CLO and ILO associations.

		Outcome ERP / Outcome									
		Null							ILO 1	ILO 2	ILO 3
		ENGR PSLO - Apply fundamental concepts of mathematics (through calculus), science and engineering.	ENGR PSLO - Communicate effectively both orally and in writing, using symbols, graphics and numbers.	ENGR PSLO - Conduct experiments and analyze and interpret data.	ENGR PSLO - Identify, formulate and solve basic engineering problems.	ENGR PSLO - Make basic design decisions concerning appropriate-level engineering problems.	ENGR PSLO - Recognize the need for, and an ability to engage in, lifelong learning.	ENGR PSLO - Use techniques, skills and modern engineering tools necessary in engineering education and practice.	Communication: Communicate effectively using verbal, visual and written language with clarity and purpose in workplace, community and academic contexts.	Critical Thinking & Problem Solving: Explore issues through various information sources; evaluate the credibility and significance of both the information and the source to arrive at a reasoned conclusion.	Global Awareness & Cultural Competence: Respectfully interact with individuals of diverse perspectives, beliefs and values being mindful of the limitation of your own cultural framework.
ENGR162	Gather and interpret temperature (cooling curve) data to generate phase diagrams for metal alloys.			X							
	Interpret microstructure from microscopic images.			X							
	Observe and describe a galvanic cell and the effect of corrosion on various metallic systems.	X									
	Perform Rockwell hardness tests on metals.			X							
	Prepare and perform tensile tests on metals and polymers.			X							
ENGR170	Analyze op amp circuits.				X						
	Analyze resistive circuits utilizing basic techniques of circuit analysis and network theorems.				X						
	Analyze steady state AC circuits, including power calculations, using complex notation and phasors.				X						
	Determine natural and forced responses of first order RL and RC circuits.				X						
	Determine natural and forced responses of second order RLC circuits.				X						
ENGR171	Analyze circuits using standard circuit analysis techniques.				X						
	Build circuits on breadboards with resistive, capacitive and inductive elements.			X							
	Generate electric signals using DC voltage sources and function generators.			X							
	Measure voltage, current, and resistance using various meters.			X							
	Measure voltage, frequency, and phase using an oscilloscope.			X							
	Record results and analyze and evaluate data.			X							
	Use computer tools to analyze/design and build a circuit system.							X			

10. Historical Associations- CLOs and ILOs/PLOs- These are the CLO and ILO associations.

		ILO 4B	ILO 5	ILO 6	ILO 7
		Outcome ERP / Outcome			
		Technology Literacy: Proficiency in a technology and the ability to choose the appropriate tools.	Quantitative Literacy: Use mathematical concepts and models to analyze and solve real life issues or problems.	Scientific Literacy: Use scientific knowledge and methodologies to assess potential solutions to real-life challenges.	Personal Responsibility & Development: Take the initiative and responsibility to assess your own actions with regard to physical wellness, learning opportunities, career planning, creative contribution to the community and ethical integrity in the
ENGR162	Gather and interpret temperature (cooling curve) data to generate phase diagrams for metal alloys.			X	
ENGR162	Interpret microstructure from microscopic images.			X	
ENGR162	Observe and describe a galvanic cell and the effect of corrosion on various metallic systems.			X	
ENGR162	Perform Rockwell hardness tests on metals.			X	
ENGR162	Prepare and perform tensile tests on metals and polymers.			X	
ENGR170	Analyze op amp circuits.		X		
ENGR170	Analyze resistive circuits utilizing basic techniques of circuit analysis and network theorems.		X		
ENGR170	Analyze steady state AC circuits, including power calculations, using complex notation and phasors.		X		
ENGR170	Determine natural and forced responses of first order RL and RC circuits.		X		
ENGR170	Determine natural and forced responses of second order RLC circuits.		X		
ENGR171	Analyze circuits using standard circuit analysis techniques.		X		
ENGR171	Build circuits on breadboards with resistive, capacitive and inductive elements.			X	
ENGR171	Generate electric signals using DC voltage sources and function generators.			X	
ENGR171	Measure voltage, current, and resistance using various meters.			X	
ENGR171	Measure voltage, frequency, and phase using an oscilloscope.			X	
ENGR171	Record results and analyze and evaluate data.			X	
ENGR171	Use computer tools to analyze/design and build a circuit system.	X			

11. Historical Associations ILO/PLO- These are the Course and ILO associations.

	Null						
	ENGR PSLO - Apply fundamental concepts of mathematics (through calculus), science and engineering.	ENGR PSLO - Communicate effectively both orally and in writing, using symbols, graphics and numbers.	ENGR PSLO - Conduct experiments and analyze and interpret data.	ENGR PSLO - Identify, formulate and solve basic engineering problems.	ENGR PSLO - Make basic design decisions concerning appropriate-level engineering problems.	ENGR PSLO - Recognize the need for, and an ability to engage in, lifelong learning.	ENGR PSLO - Use techniques, skills and modern engineering tools necessary in engineering education and practice.
ENGR100		X			X	X	
ENGR124	X	X	X				X
ENGR126	X	X					X
ENGR152	X			X			
ENGR154				X			
ENGR156				X			
ENGR161	X			X			
ENGR162	X		X				X
ENGR170				X			
ENGR171			X	X			X

11. Historical Associations ILO/PLO- These are the Course and ILO associations.

	ILO 1 Communication: Communicate effectively using verbal, visual and written language with clarity and purpose in workplace, community and academic contexts.	ILO 2 Critical Thinking & Problem Solving: Explore issues through various information sources; evaluate the credibility and significance of both the information and the source to arrive at a reasoned conclusion.	ILO 3 Global Awareness & Cultural Competence: Respectfully interact with individuals of diverse perspectives, beliefs and values being mindful of the limitation of your own cultural framework.	ILO 4B Technology Literacy: Proficiency in a technology and the ability to choose the appropriate tools.	ILO 5 Quantitative Literacy: Use mathematical concepts and models to analyze and solve real life issues or problems.	ILO 6 Scientific Literacy: Use scientific knowledge and methodologies to assess potential solutions to real-life challenges.	ILO 7 Personal Responsibility & Development: Take the initiative and responsibility to assess your own actions with regard to physical wellness, learning opportunities, career planning, creative contribution to the community and ethical integrity in the
ENGR100	X	X	X				X
ENGR124	X			X	X	X	
ENGR126	X			X	X		
ENGR152					X		
ENGR154					X		
ENGR156					X		
ENGR161					X	X	
ENGR162				X		X	
ENGR170					X		
ENGR171				X	X	X	

12. Course Improvement Plans- These are all the course improvement plans that have been reported for the last 6 years. The terms and courses that do not have improvement plans reported have been filtered out.

E2. Statistics

Annual Update Student Learning Outcomes Packet

III. Quality and Innovation in the Program and Curriculum Review

Please refer to the current SLO data set for your program found at: http://research.hancockcollege.edu/student_learning_outcomes/matrix.html#Top

a. Are you on track in your assessment plan for course and program SLOs? If not, please explain why.

b. Have you shared your assessments or improvement plans with your department, program or advisory committee? If so, what actions resulted? If not, how do you plan to do so in the future?

c. Did any of section, course or program improvement plans indicate that your program would benefit from specific resources in order to support student learning and/or faculty development? If so, please explain.

d. In reviewing your outcomes and assessments have you identified any and all that indicate a modification should be made to the course outline, the student learning outcomes or the program outcomes? Please state what modifications you will be making.

e. Have all course outlines been reviewed within the last 5 years? If not, please explain the plan to bring course outlines up to date and include time-lines for the review and submission to AP&P.

Sample Form Completed

ASSESSMENT SCHEDULE

6 Year

Program:______________________________

page ____ of _____

Use one row for each course or program outcome

SLO	To be assessed in semester:	Assessment method (s)	Resources needed to conduct assessment	Individual responsible for Improvement Plan	Date to complete review
1.1 Using the rocket equation and mission parameters, students will determine the mass fraction and exit velocity of an ideal rocket	Fall 2011, Fall 2012, Fall 2013	Student answers on final exam scores will be graded anonymously by two RP instructors, on a scale of 1 to 5, using a predetermined rubric.		Joe Yi	February 15, following the final exam semester.
1.2 Given mission requirements, students will lead a brainstorm session to sketch out rocket design features	Spring 2012, Spring 2013, Spring 2014	The outside experts will use a scoring rubric to judge the team leader's performance. They will also provide a qualitative strengths and weaknesses analysis of the final design, which will be a team grade.	May need room and meals for judge training.	Vesuvious McNuttal	May 15 of the semester when the judging takes place.

*This document is not in this packet, but can be found, if completed, on the Program Matrix (linked to the left). If not complete, a blank form can be found on the Student Learning Outcomes myHancock portal.

Fall 2017

2017 Course Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Mathematics >> MATH123 - Fall 2017					
What did the assessment data indicate about the strengths of your course?	No action type	Anonymous	The assessment data showed that (of the teacher who entered data), 81.47% of their students met or exceeded the standard. Since our goal is 70%, we were well above the goal. Almost every teacher who responded, stated that students demonstrated an understanding of hypothesis testing. Several teachers commented that the standards were efficiently taught, that students understood key points, and that only minor mistakes	2018-02-05	
What did the assessment data indicate about the weaknesses of your course?	No action type	Anonymous	The comments on the weaknesses of the course were varied according to the responding teachers. Some of the teachers mentioned that their students mixed up the order of operations, mixed up their inequality symbols when comparing the standardized test statistic to the critical value, mixed up the way to verify normality on a 2 sample proportion hypothesis test with a 2 sample proportion confidence interval. One teacher mentioned that 1/3 of their class was not able to fully complete the hypothesis test question. Other teachers mentioned that students were unable to retain knowledge of hypothesis tests for the final exam and did not verify their answers	2018-02-05	

*This section from the this document is under the "Action Plan". This sub-section contains any "Course Improvement Plan" that has been written for this course. If there is no text, then there was no Improvement plan submitted on eLumen. It will also have any resource requests that were entered into eLumen.

Assessments

Summer 2017

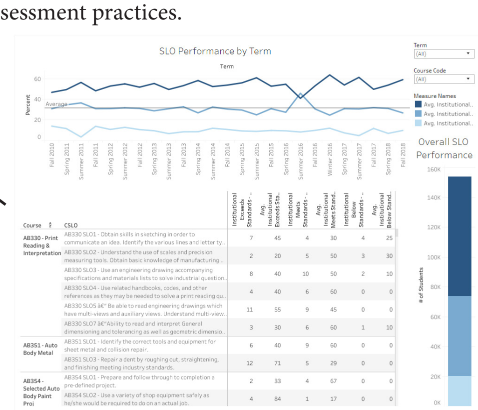
Grammar and Vocabulary Test

SLO	Scored	Institutional Exceeds Standards	Institutional Meets Standards	Institutional Below Standards	N/A
SPAN101 SLO1 - Use grammar and vocabulary at the appropriate level.	21 of 87	10	2	6	3

Grammar and Vocabulary Test

SLO	Scored	Institutional Exceeds Standards	Institutional Meets Standards	Institutional Below Standards	N/A
SPAN101 SLO1 - Use grammar and vocabulary at the appropriate level.	19 of 87	3	8	5	3

*This section from the this document is under the heading "Assessments contains all of the outcomes that were measured and indicate performance. Below, you can find the dashboard with SLO performance by outcomes. You can filter based on outcome, discipline, and term. You can use the "Snipping Tool" to add any visual charts to your update. Also, you can use the data to make conclusions about assessment practices.



Context Statistics And Evidence

Engineering

Date: 02/28/2019

Terms Spring 2018, Fall 2017, Summer 2017

Summary

Statistic	Number of Courses	Courses
Courses in the Department	11	ENGR100, ENGR124, ENGR126, ENGR152, ENGR154, ENGR156, ENGR161, ENGR162, ENGR170, ENGR171, ENGR189
Courses with CSLOs	10	ENGR100, ENGR124, ENGR126, ENGR152, ENGR154, ENGR156, ENGR161, ENGR162, ENGR170, ENGR171
Courses without CSLOs	1	ENGR189
Courses with CSLOs mapped to PSLOs	10	ENGR100, ENGR124, ENGR126, ENGR152, ENGR154, ENGR156, ENGR161, ENGR162, ENGR170, ENGR171
Courses without CSLOs mapped to PSLOs	1	ENGR189
Courses with direct assessment of PSLOs	0	
Courses with CSLOs mapped to ILOs	10	ENGR100, ENGR124, ENGR126, ENGR152, ENGR154, ENGR156, ENGR161, ENGR162, ENGR170, ENGR171
Courses without CSLOs mapped to ILOs	1	ENGR189
Courses with direct assessment of ILOs	0	
Courses with at least one planned Assessment	1	ENGR100
Courses with planned Assessments scored	1	ENGR100
Courses with some Assessments scored	0	
Courses without any Assessment scored	0	
Courses with no planned Assessments	10	ENGR124, ENGR126, ENGR152, ENGR154, ENGR156, ENGR161, ENGR162, ENGR170, ENGR171, ENGR189
Courses with at least one planned Action Plan	11	ENGR100, ENGR124, ENGR126, ENGR152, ENGR154, ENGR156, ENGR161, ENGR162, ENGR170, ENGR171, ENGR189
Courses with Action Plan Responses	0	
Courses with some Action Plan Responses	0	
Courses without Action Plan Responses	11	ENGR100, ENGR124, ENGR152, ENGR170, ENGR171, ENGR162, ENGR126, ENGR154, ENGR156, ENGR161, ENGR189
Courses with no planned Action Plans	0	

ENGR100 - Introduction to Engineering

SLOs

CSLOs	» ENGR100 SLO1 - Explain the basic differences between the various engineering branches, and how these branches relate to fields in science. » ENGR100 SLO2 - Describe the engineering design process; i.e., the steps of problem solving. » ENGR100 SLO3 - Describe academic requirements, attitudes, and skills that lead to success in the study of science and of engineering. » ENGR100 SLO4 - Create a schedule of courses for their next 2-4 academic terms at AHC (and/or transfer institution). » ENGR100 SLO5 - Explain in oral and written forms how a piece of technology works.
Mapped PSLOs	**Engineering Program Outcomes** Engineering Program Outcomes » ENGR PSLO - Make basic design decisions concerning appropriate-level engineering problems. » ENGR PSLO - Communicate effectively both orally and in writing, using symbols, graphic and numbers. » ENGR PSLO - Recognize the need for, and an ability to engage in, lifelong learning.

Mapped ILOs	**ILO** ILO 7 - Personal Responsibility & Development » ILO 7 - Personal Responsibility & Development: Take the initiative and responsibility assess your own actions with regard to physical wellness, learning opportunities, career planning, creative contribution to the community and ethical integrity in the home, workplace and community. ILO 3 - Global Awareness & Cultural Competence » ILO 3 - Global Awareness & Cultural Competence: Respectfully interact with individuals of diverse perspectives, beliefs and values being mindful of the limitation of your own cultural framework. ILO 2 - Critical Thinking & Problem Solving » ILO 2 - Critical Thinking & Problem Solving: Explore issues through various information sources; evaluate the credibility and significance of both the information and the source to arrive at a reasoned conclusion. ILO 1 - Communication » ILO 1 - Communication: Communicate effectively using verbal, visual and written language with clarity and purpose in workplace, community and academic contexts.

Assessments

Fall 2017

e100 - SLO 1

SLO	Scored	Institutional Exceeds Standards	Institutional Meets Standards	Institutional Below Standards	N/A
ENGR100 SLO1 - Explain the basic differences between the various engineering branches, and how these branches relate to fields in science.	32 of 55	2	24	0	6

Action Plans

Fall 2017

2017 Course Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR100 - Fall 2017					

Spring 2018

2017 Context Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR100 - Spring 2018					

2017 Course Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR100 - Spring 2018					

ENGR124 - Excel in Science/Engineering

SLOs

CSLOs	» ENGR124 SLO1 - Input a set of data in Excel, and perform mathematical operations on it. » ENGR124 SLO2 - Plot a set of data in Excel, format and display it in a professional manner with appropriate annotations and graphics, and integrate it into a Word document. » ENGR124 SLO3 - Sort data, apply conditional formatting and utilize an Excel spreadsheet as a database. » ENGR124 SLO4 - Solve algebraic equations and systems of linear equations. » ENGR124 SLO5 - Create a spreadsheet in Excel to perform numerical differentiation and integration. » ENGR124 SLO6 - Solve science and engineering problems using Excel's engineering and statistical functions.
Mapped PSLOs	**Engineering Program Outcomes** Engineering Program Outcomes » ENGR PSLO - Apply fundamental concepts of mathematics (through calculus), science and engineering. » ENGR PSLO - Conduct experiments and analyze and interpret data. » ENGR PSLO - Communicate effectively both orally and in writing, using symbols, graphic and numbers. » ENGR PSLO - Use techniques, skills and modern engineering tools necessary in engineering education and practice.
	ILO ILO 4 - Information & Technology Literacy » ILO 4B - Technology Literacy: Proficiency in a technology and the ability to choose the appropriate tools. ILO 5 - Quantitative Literacy

Mapped ILOs	» ILO 5 - Quantitative Literacy: Use mathematical concepts and models to analyze and solve real life issues or problems. ILO 6 - Scientific Literacy » ILO 6 - Scientific Literacy: Use scientific knowledge and methodologies to assess potential solutions to real-life challenges. ILO 1 - Communication » ILO 1 - Communication: Communicate effectively using verbal, visual and written language with clarity and purpose in workplace, community and academic contexts.

Action Plans

Fall 2017

2017 Course Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR124 - Fall 2017					

Spring 2018

2017 Context Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR124 - Spring 2018					

2017 Course Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR124 - Spring 2018					

ENGR126 - Matlab for Science/Engineering

SLOs

CSLOs	» ENGR126 SLO1 - Operate within the MATLAB environment to utilize scalar, vector, and matrix functions. » ENGR126 SLO2 - Program script files in MATLAB to solve numerical problems and present results in a professional manner. » ENGR126 SLO3 - Import data sets into MATLAB and create 2 dimensional and 3 dimensional plots of data sets. » ENGR126 SLO4 - Create m-files in MATLAB. » ENGR126 SLO5 - Perform curve fitting and interpolation on data sets. » ENGR126 SLO6 - Solve ODE problems utilizing MATLAB's built-in solvers. » ENGR126 SLO7 - Export data set from MATLAB into Excel, and integrate it into a Word document.
Mapped PSLOs	**Engineering Program Outcomes** Engineering Program Outcomes » ENGR PSLO - Apply fundamental concepts of mathematics (through calculus), science and engineering. » ENGR PSLO - Communicate effectively both orally and in writing, using symbols, graphic and numbers. » ENGR PSLO - Use techniques, skills and modern engineering tools necessary in engineering education and practice.
Mapped ILOs	**ILO** ILO 4 - Information & Technology Literacy » ILO 4B - Technology Literacy: Proficiency in a technology and the ability to choose the appropriate tools. ILO 5 - Quantitative Literacy » ILO 5 - Quantitative Literacy: Use mathematical concepts and models to analyze and solve real life issues or problems. ILO 1 - Communication » ILO 1 - Communication: Communicate effectively using verbal, visual and written language with clarity and purpose in workplace, community and academic contexts.

Action Plans

Fall 2017

2017 Course Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR126 - Fall 2017					

Spring 2018

2017 Context Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR126 - Spring 2018					

2017 Course Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR126 - Spring 2018					

ENGR152 - Statics

SLOs

CSLOs	» ENGR152 SLO1 - Generate appropriate Free Body Diagrams. » ENGR152 SLO2 - Formulate and solve problems involving statically applied forces in two and three dimensions. » ENGR152 SLO3 - Analyze trusses, frames and simple machines. » ENGR152 SLO4 - Locate mathematically the centroids of areas. » ENGR152 SLO5 - Calculate internal forces and bending moments in beam systems. » ENGR152 SLO6 - Calculate cable loads and fluid forces. » ENGR152 SLO7 - Formulate and solve static problems involving frictional forces.
Mapped PSLOs	**Engineering Program Outcomes** Engineering Program Outcomes » ENGR PSLO - Apply fundamental concepts of mathematics (through calculus), science and engineering. » ENGR PSLO - Identify, formulate and solve basic engineering problems.
Mapped ILOs	**ILO** ILO 5 - Quantitative Literacy » ILO 5 - Quantitative Literacy: Use mathematical concepts and models to analyze and solve real life issues or problems.

Action Plans

Fall 2017

2017 Course Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR152 - Fall 2017					

Spring 2018

2017 Context Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR152 - Spring 2018					

2017 Course Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR152 - Spring 2018					

ENGR154 - Dynamics

SLOs

CSLOs	» ENGR154 SLO1 - Formulate and solve problems involving the kinematics of particles in 2- and 3-dimensions, including relative and constrained motion problems. » ENGR154 SLO2 - Formulate and solve problems involving the kinetics of particles in 2- and 3-dimensions, using Newton’s 2nd Law, energy and impulse-momentum methods. » ENGR154 SLO3 - Formulate and solve problems involving the planar kinematics of rigid bodies. » ENGR154 SLO4 - Describe analytically the rotational motion of rigid bodies.
Mapped PSLOs	**Engineering Program Outcomes** Engineering Program Outcomes » ENGR PSLO - Identify, formulate and solve basic engineering problems.
Mapped ILOs	**ILO** ILO 5 - Quantitative Literacy » ILO 5 - Quantitative Literacy: Use mathematical concepts and models to analyze and solve real life issues or problems.

Action Plans

Fall 2017

2017 Course Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR154 - Fall 2017					

Spring 2018

2017 Context Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR154 - Spring 2018					

2017 Course Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR154 - Spring 2018					

ENGR156 - Strength of Materials

SLOs

	» ENGR156 SLO1 - Determine the internal loads (forces and moments) in each structural member of an engineering system, given an external loading condition.

CSLOs	» ENGR156 SLO2 - Identify the applicable theory, and apply the appropriate equations calculate the internal stresses, strains and/or displacements in axial members, torsion members, beams, pressure vessels and bolted connections. » ENGR156 SLO3 - Determine the stresses, strains and displacements in members subjected to combined loading. » ENGR156 SLO4 - Perform coordinate transformations of stresses and strains at a point, including using Mohr's Circle. » ENGR156 SLO5 - Determine if a structural system meets its design specifications, and/or determine how the system will fail, given or having calculated the stresses, strains and displacements. » ENGR156 SLO6 - Determine the buckling loads of various columns.
Mapped PSLOs	**Engineering Program Outcomes** Engineering Program Outcomes » ENGR PSLO - Identify, formulate and solve basic engineering problems.
Mapped ILOs	**ILO** ILO 5 - Quantitative Literacy » ILO 5 - Quantitative Literacy: Use mathematical concepts and models to analyze and solve real life issues or problems.

Action Plans

Fall 2017

2017 Course Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR156 - Fall 2017					

Spring 2018

2017 Context Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR156 - Spring 2018					

2017 Course Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR156 - Spring 2018					

ENGR161 - Materials Science

SLOs

CSLOs	» ENGR161 SLO1 - Distinguish between the various types of atomic bonds. » ENGR161 SLO2 - Solve diffusion problems. » ENGR161 SLO3 - Solve problems relating to the elastic and plastic deformation of materials. » ENGR161 SLO4 - Solve problems relating to basic fracture and fatigue. » ENGR161 SLO5 - Associate mechanical properties of metals with their structure, defects and mechanical and thermal processing. » ENGR161 SLO6 - Use phase diagrams to determine composition. » ENGR161 SLO7 - Describe the role that corrosion plays in the degradation of materials. » ENGR161 SLO8 - Compare mechanical and electrical behaviors of metals, ceramics and semiconductors » ENGR161 SLO9 - Describe different techniques for forming and shaping metals and ceramics.
Mapped PSLOs	**Engineering Program Outcomes** Engineering Program Outcomes » ENGR PSLO - Apply fundamental concepts of mathematics (through calculus), science and engineering. » ENGR PSLO - Identify, formulate and solve basic engineering problems.
Mapped ILOs	**ILO** ILO 5 - Quantitative Literacy » ILO 5 - Quantitative Literacy: Use mathematical concepts and models to analyze and solve real life issues or problems. ILO 6 - Scientific Literacy » ILO 6 - Scientific Literacy: Use scientific knowledge and methodologies to assess potential solutions to real-life challenges.

Action Plans

Fall 2017

2017 Course Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR161 - Fall 2017					

Spring 2018

2017 Context Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR161 - Spring 2018					

2017 Course Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR161 - Spring 2018					

ENGR162 - Materials Science Lab

SLOs

CSLOs	» ENGR162 SLO1 - Construct models of metallic bonds and calculate their geometric properties. » ENGR162 SLO2 - Prepare and perform tensile tests on metals and polymers. » ENGR162 SLO3 - Analyze tensile test stress-strain data. » ENGR162 SLO4 - Perform Rockwell hardness tests on metals. » ENGR162 SLO5 - Perform impact tests on metals and relate results to specimen temperature. » ENGR162 SLO6 - Interpret microstructure from microscopic images. » ENGR162 SLO7 - Gather and interpret temperature (cooling curve) data to generate phase diagrams for metal alloys. » ENGR162 SLO8 - Observe and describe a galvanic cell and the effect of corrosion on various metallic systems. » ENGR162 SLO9 - Measure electrical properties of semiconductors (optional). » ENGR162 SLO11 - Gather and analyze test data and images using computers.
Mapped PSLOs	**Engineering Program Outcomes** Engineering Program Outcomes » ENGR PSLO - Apply fundamental concepts of mathematics (through calculus), science and engineering. » ENGR PSLO - Conduct experiments and analyze and interpret data. » ENGR PSLO - Use techniques, skills and modern engineering tools necessary in engineering education and practice.
Mapped ILOs	**ILO** ILO 4 - Information & Technology Literacy » ILO 4B - Technology Literacy: Proficiency in a technology and the ability to choose the appropriate tools. ILO 6 - Scientific Literacy » ILO 6 - Scientific Literacy: Use scientific knowledge and methodologies to assess potential solutions to real-life challenges.

Action Plans

Fall 2017

2017 Course Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR162 - Fall 2017					

Spring 2018

2017 Context Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR162 - Spring 2018					

2017 Course Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR162 - Spring 2018					

ENGR170 - Electric Circuit Analysis

SLOs

CSLOs	» ENGR170 SLO1 - Analyze resistive circuits utilizing basic techniques of circuit analysis and network theorems. » ENGR170 SLO2 - Analyze op-amp circuits. » ENGR170 SLO3 - Determine natural and forced responses of first-order RL and RC circuits. » ENGR170 SLO4 - Determine natural and forced responses of second-order RLC circuits. » ENGR170 SLO5 - Analyze steady-state AC circuits, including power calculations, using complex notation and phasors.
Mapped PSLOs	**Engineering Program Outcomes** Engineering Program Outcomes » ENGR PSLO - Identify, formulate and solve basic engineering problems.
Mapped ILOs	**ILO** ILO 5 - Quantitative Literacy

Mapped ILOs	» ILO 5 - Quantitative Literacy: Use mathematical concepts and models to analyze and solve real life issues or problems.

Action Plans

Fall 2017

2017 Course Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR170 - Fall 2017					

Spring 2018

2017 Context Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR170 - Spring 2018					

2017 Course Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR170 - Spring 2018					

ENGR171 - Electric Circuit Lab

SLOs

CSLOs	» ENGR171 SLO1 - Analyze circuits using standard circuit analysis techniques. » ENGR171 SLO2 - Build circuits on breadboards with resistive, capacitive and inductive elements. » ENGR171 SLO3 - Generate electric signals using DC voltage sources and function generators. » ENGR171 SLO4 - Measure voltage, current, and resistance using various meters. » ENGR171 SLO5 - Measure voltage, frequency, and phase using an oscilloscope. » ENGR171 SLO6 - Record results and analyze and evaluate data. » ENGR171 SLO7 - Use computer tools to analyze/design and build a circuit system.
Mapped PSLOs	**Engineering Program Outcomes** Engineering Program Outcomes » ENGR PSLO - Identify, formulate and solve basic engineering problems. » ENGR PSLO - Conduct experiments and analyze and interpret data. » ENGR PSLO - Use techniques, skills and modern engineering tools necessary in engineering education and practice.
Mapped ILOs	**ILO** ILO 4 - Information & Technology Literacy » ILO 4B - Technology Literacy: Proficiency in a technology and the ability to choose the appropriate tools. ILO 5 - Quantitative Literacy » ILO 5 - Quantitative Literacy: Use mathematical concepts and models to analyze and solve real life issues or problems. ILO 6 - Scientific Literacy » ILO 6 - Scientific Literacy: Use scientific knowledge and methodologies to assess potential solutions to real-life challenges.

Action Plans

Fall 2017

2017 Course Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR171 - Fall 2017					

Spring 2018

2017 Context Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR171 - Spring 2018					

2017 Course Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR171 - Spring 2018					

ENGR189 - Independent Projects

SLOs

CSLOs	(None)
Mapped PSLOs	(None)
Mapped ILOs	(None)

Action Plans

Fall 2017

2017 Course Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request

Allan Hancock College >> Engineering >> ENGR189 - Fall 2017

Spring 2018

2017 Context Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR189 - Spring 2018					

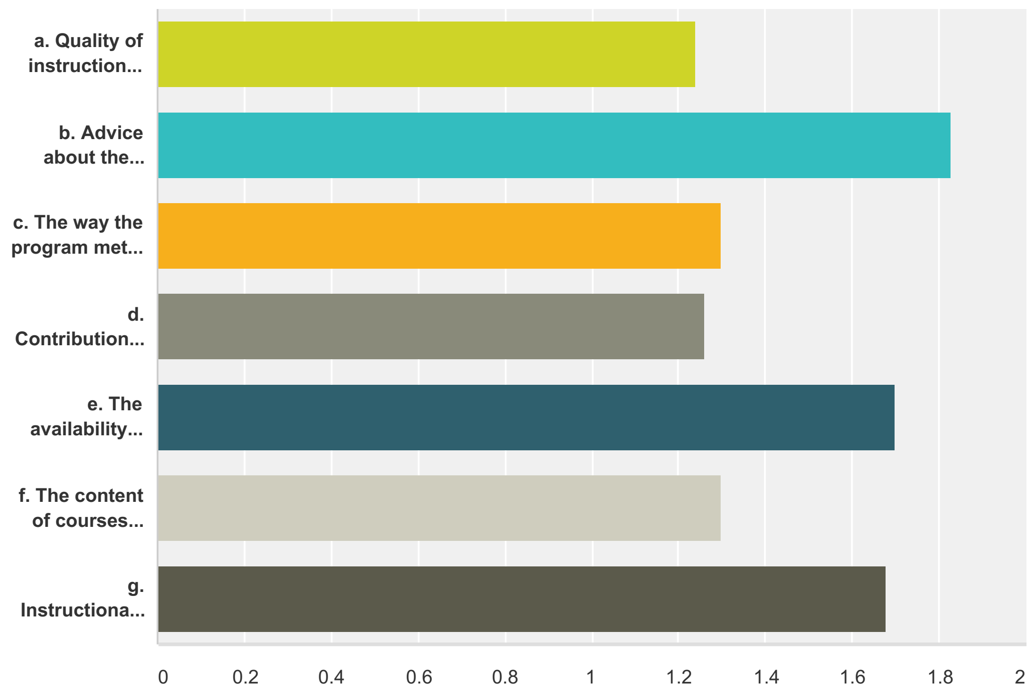
2017 Course Improvement Plan

Expected Action	Action Type	Respondent	Action Taken	Date	Resource Request
Allan Hancock College >> Engineering >> ENGR189 - Spring 2018					

E3. Alumni Survey

Q1 Indicate your satisfaction, in general, with the following aspects of the AHC Engineering Program:

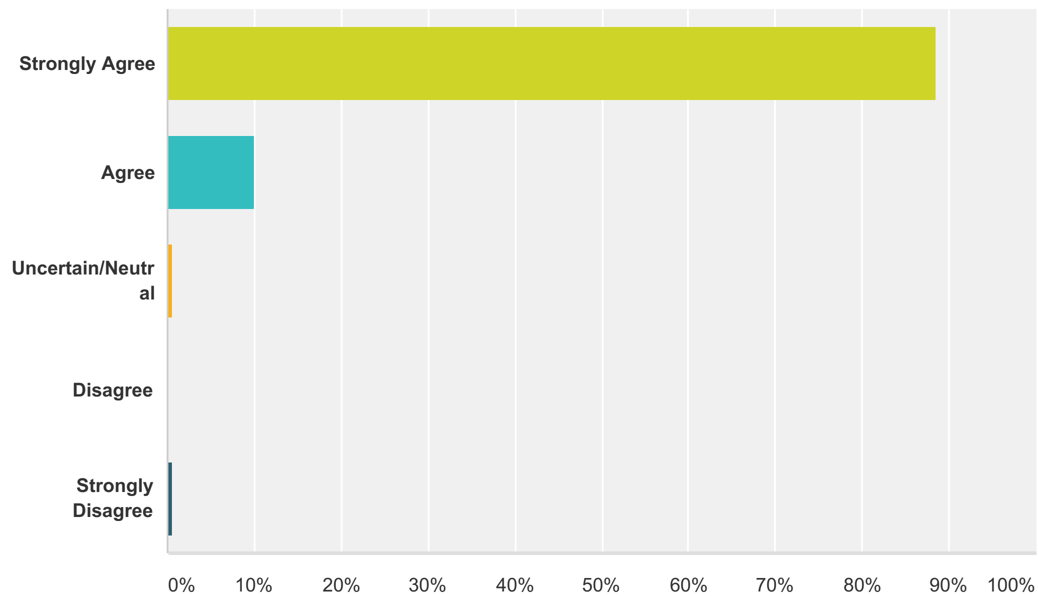
Answered: 149 Skipped: 0



	Highly Satisfied	(no label)	Moderately Satisfied	(no label)	Not at all Satisfied	Total	Weighted Average
a. Quality of instruction within the program	**79.87%** 119	**16.11%** 24	**4.03%** 6	**0.00%** 0	**0.00%** 0	149	1.24
b. Advice about the program from counselors	**46.31%** 69	**30.20%** 45	**18.79%** 28	**3.36%** 5	**1.34%** 2	149	1.83
c. The way the program met your education needs	**72.48%** 108	**24.83%** 37	**2.68%** 4	**0.00%** 0	**0.00%** 0	149	1.30
d. Contribution towards your intellectual growth	**79.19%** 118	**16.11%** 24	**4.70%** 7	**0.00%** 0	**0.00%** 0	149	1.26
e. The availability of courses offered in the program	**50.34%** 75	**30.87%** 46	**16.78%** 25	**2.01%** 3	**0.00%** 0	149	1.70
f. The content of courses offered in the program	**73.65%** 109	**23.65%** 35	**2.03%** 3	**0.68%** 1	**0.00%** 0	148	1.30
g. Instructional equipment (e.g., computers, lab equipment).	**51.01%** 76	**33.56%** 50	**12.08%** 18	**3.36%** 5	**0.00%** 0	149	1.68

Q2 I would recommend taking courses in the Engineering Program at Allan Hancock College.

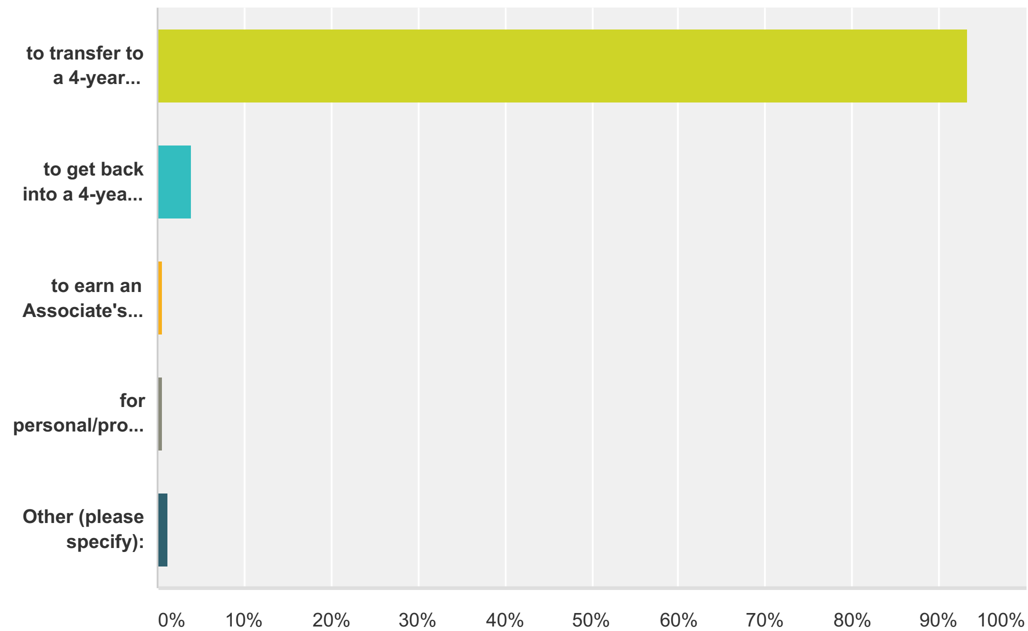
Answered: 149 Skipped: 0



Answer Choices	Responses	
Strongly Agree	**88.59%**	132
Agree	**10.07%**	15
Uncertain/Neutral	**0.67%**	1
Disagree	**0.00%**	0
Strongly Disagree	**0.67%**	1
Total		**149**

Q3 Why did you enroll in AHC Engineering?

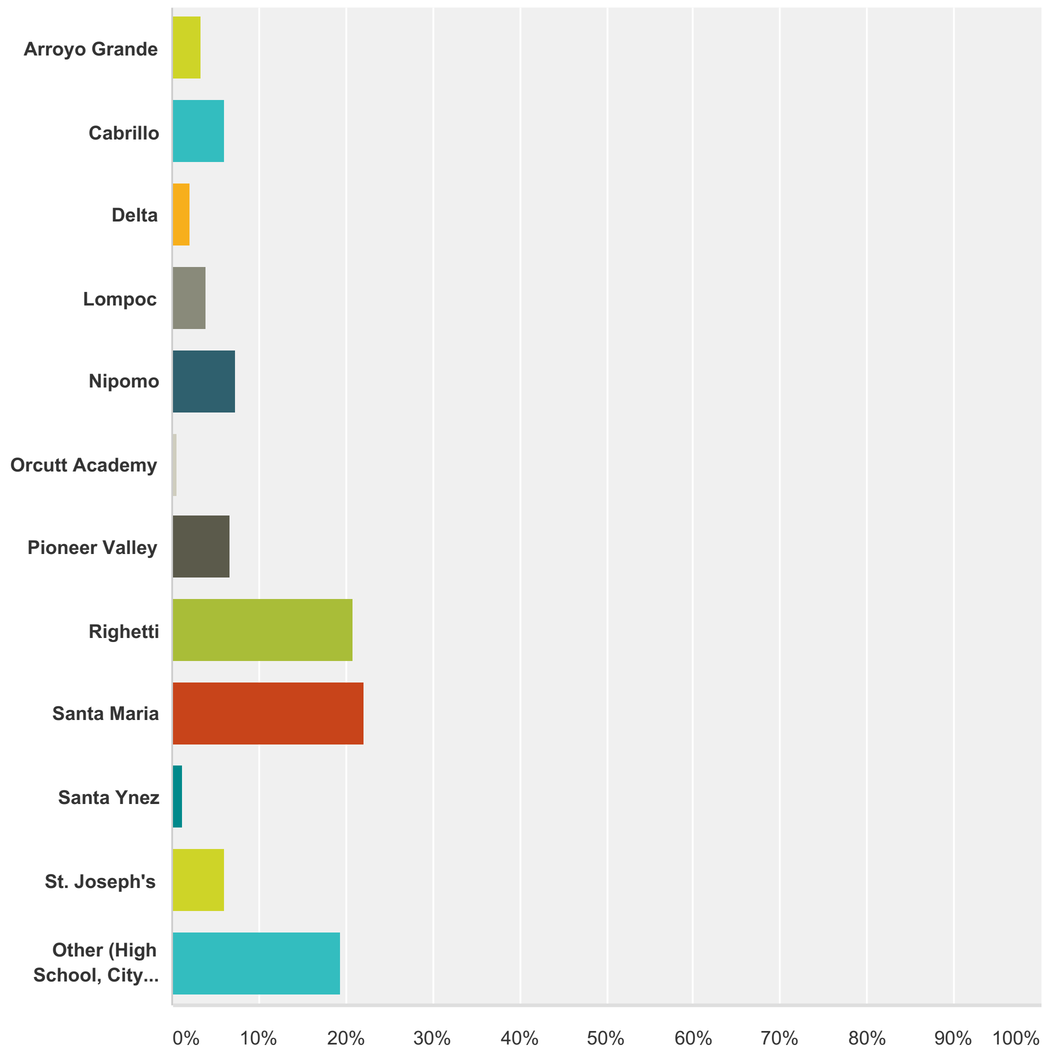
Answered: 149 Skipped: 0



Answer Choices	Responses	
to transfer to a 4-year university.	**93.29%**	139
to get back into a 4-year university (e.g., you already had attended a 4-year university).	**4.03%**	6
to earn an Associate's Degree in Engineering.	**0.67%**	1
for personal/professional enrichment (e.g., review for F.E./E.I.T., etc.).	**0.67%**	1
Other (please specify):	**1.34%**	2
Total		**149**

Q4 Where did you graduate high school?

Answered: 149 Skipped: 0

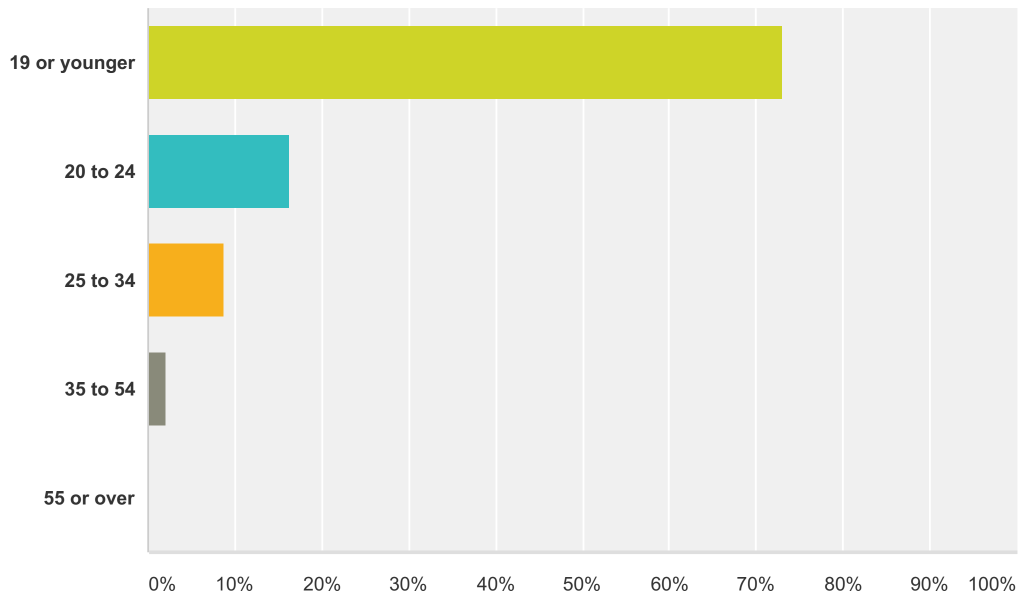


Answer Choices	Responses	
Arroyo Grande	**3.36%**	5
Cabrillo	**6.04%**	9
Delta	**2.01%**	3
Lompoc	**4.03%**	6
Nipomo	**7.38%**	11
Orcutt Academy	**0.67%**	1
Pioneer Valley	**6.71%**	10
Righetti	**20.81%**	31
Santa Maria	**22.15%**	33
Santa Ynez	**1.34%**	2

St. Joseph's	**6.04%**	9
Other (High School, City, State):	**19.46%**	29
Total		**149**

Q5 How old were you when you started as student at AHC?

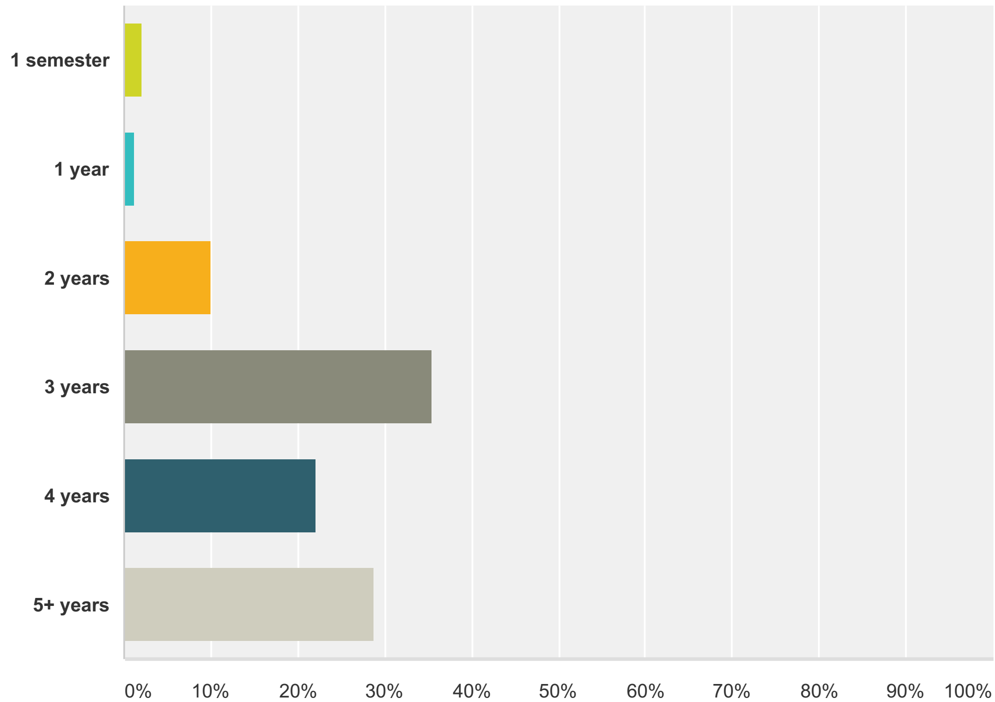
Answered: 148 Skipped: 1



Answer Choices	Responses	
19 or younger	**72.97%**	108
20 to 24	**16.22%**	24
25 to 34	**8.78%**	13
35 to 54	**2.03%**	3
55 or over	**0.00%**	0
Total		**148**

Q6 How long were you a student at AHC (if you transferred mid-year, round up)

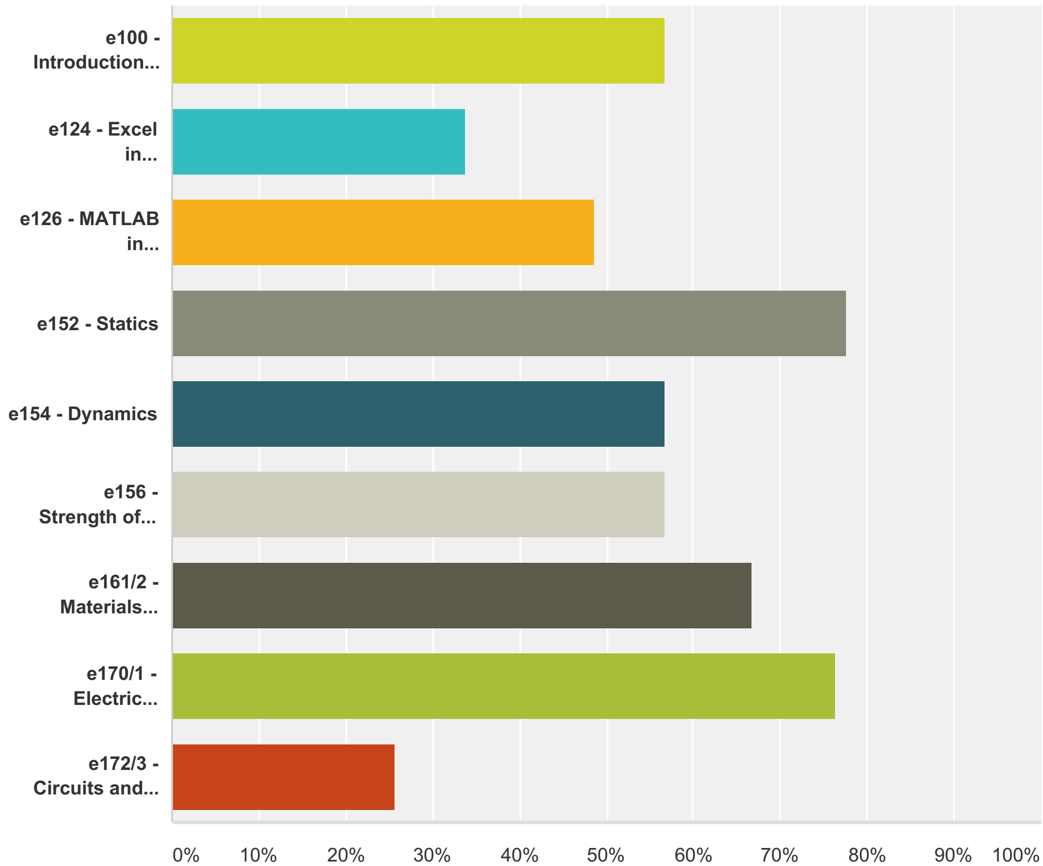
Answered: 149 Skipped: 0



Answer Choices	Responses	
1 semester	**2.01%**	3
1 year	**1.34%**	2
2 years	**10.07%**	15
3 years	**35.57%**	53
4 years	**22.15%**	33
5+ years	**28.86%**	43
Total		**149**

Q7 What engineering classes did you take at AHC?

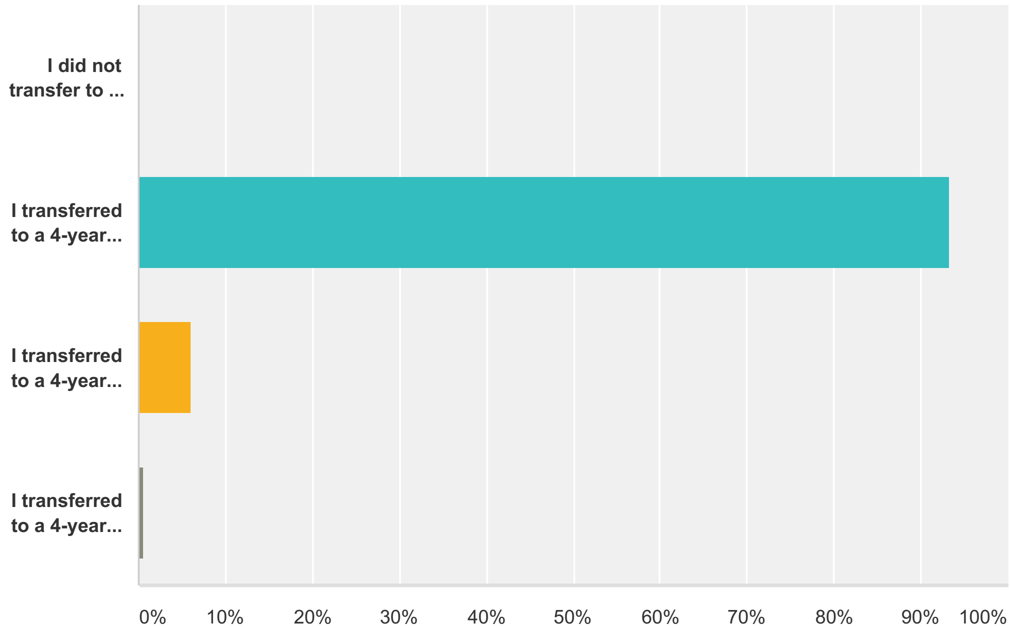
Answered: 148 Skipped: 1



Answer Choices	Responses	
e100 - Introduction to Engineering	**56.76%**	84
e124 - Excel in Science/Engineering	**33.78%**	50
e126 - MATLAB in Science/Engineering	**48.65%**	72
e152 - Statics	**77.70%**	115
e154 - Dynamics	**56.76%**	84
e156 - Strength of Materials	**56.76%**	84
e161/2 - Materials Science	**66.89%**	99
e170/1 - Electric Circuit Analysis	**76.35%**	113
e172/3 - Circuits and Devices (Circuits 2)	**25.68%**	38
Total Respondents: 148		

Q8 Which of the following best describes what you did after leaving AHC. (STEM = Science, Technology, Engineering, Mathematics, Computer Science, etc.)

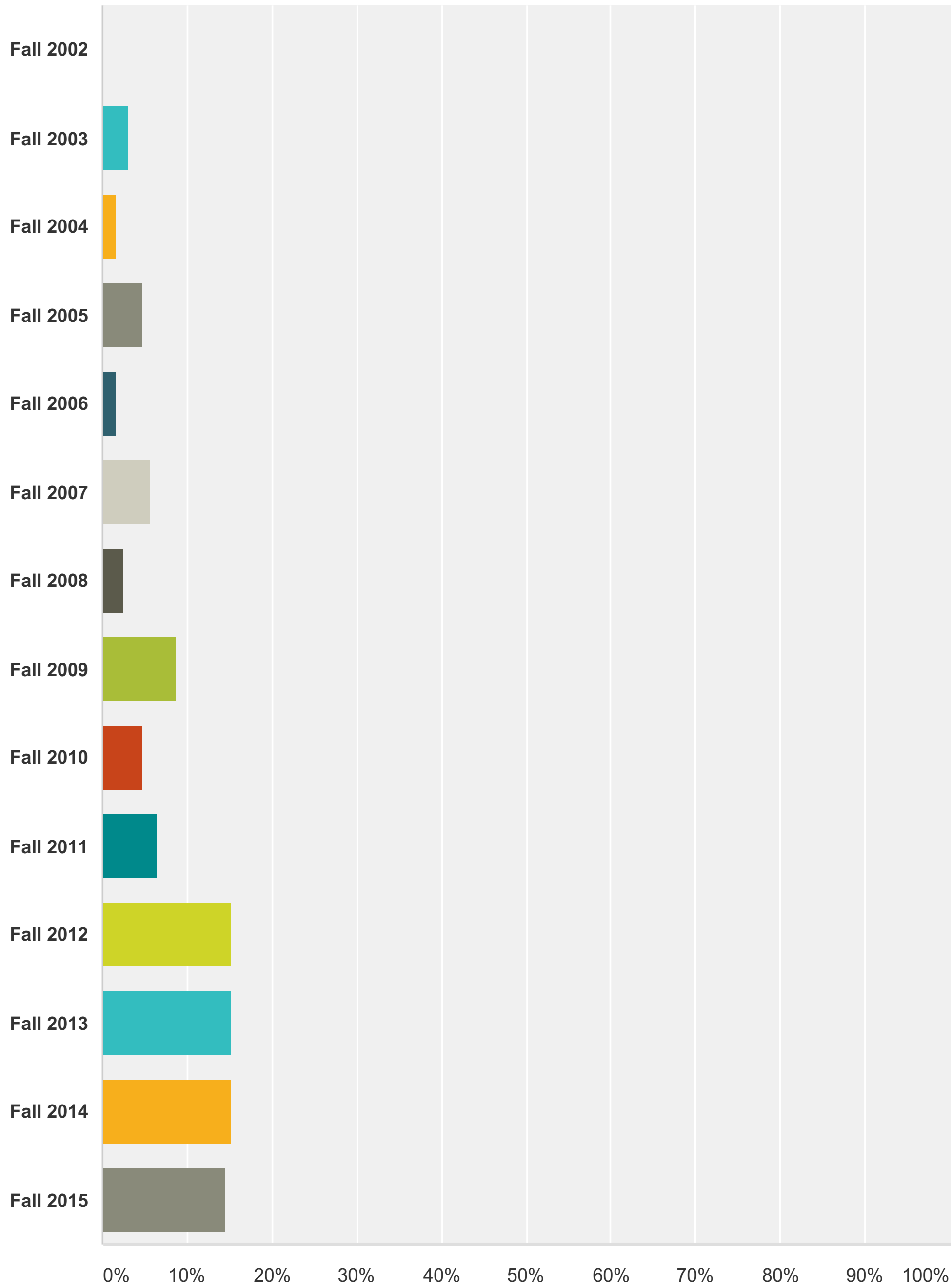
Answered: 149 Skipped: 0



Answer Choices	Responses	
I did not transfer to a 4-year university	**0.00%**	0
I transferred to a 4-year university in Engineering (even if you took a break)	**93.29%**	139
I transferred to a 4-year university in another STEM major (even if you took a break)	**6.04%**	9
I transferred to a 4-year university in a non-STEM major (even if you took a break)	**0.67%**	1
Total		**149**

Q9 When did you transfer to the university? (mid-year transfers use the previous Fall)

Answered: 124 Skipped: 25

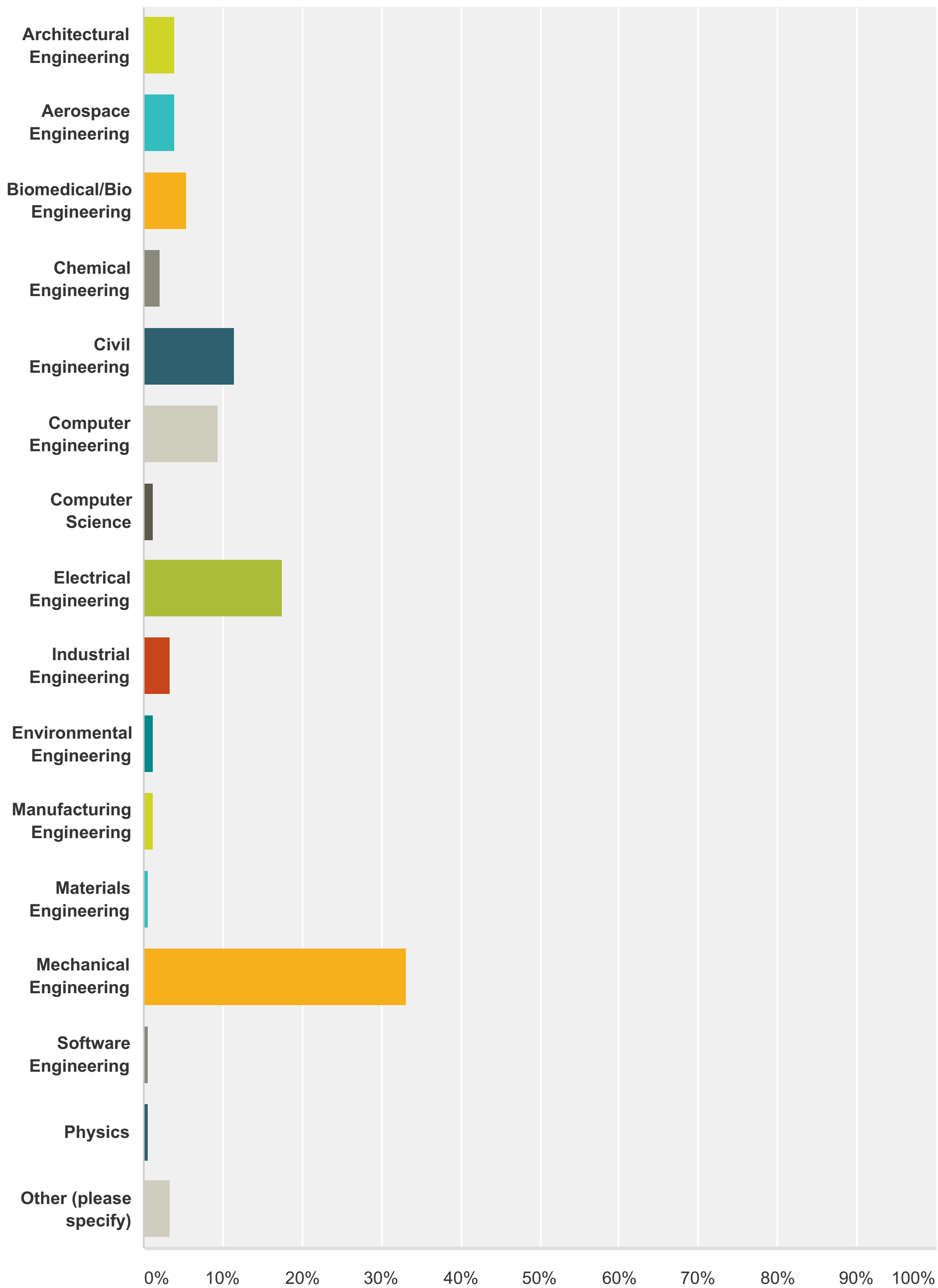


Answer Choices	Responses	
Fall 2002	**0.00%**	0
Fall 2003	**3.23%**	4
Fall 2004	**1.61%**	2
Fall 2005	**4.84%**	6

Fall 2006	**1.61%**	2
Fall 2007	**5.65%**	7
Fall 2008	**2.42%**	3
Fall 2009	**8.87%**	11
Fall 2010	**4.84%**	6
Fall 2011	**6.45%**	8
Fall 2012	**15.32%**	19
Fall 2013	**15.32%**	19
Fall 2014	**15.32%**	19
Fall 2015	**14.52%**	18
Total		**124**

Q10 What major did you transfer in?

Answered: 148 Skipped: 1

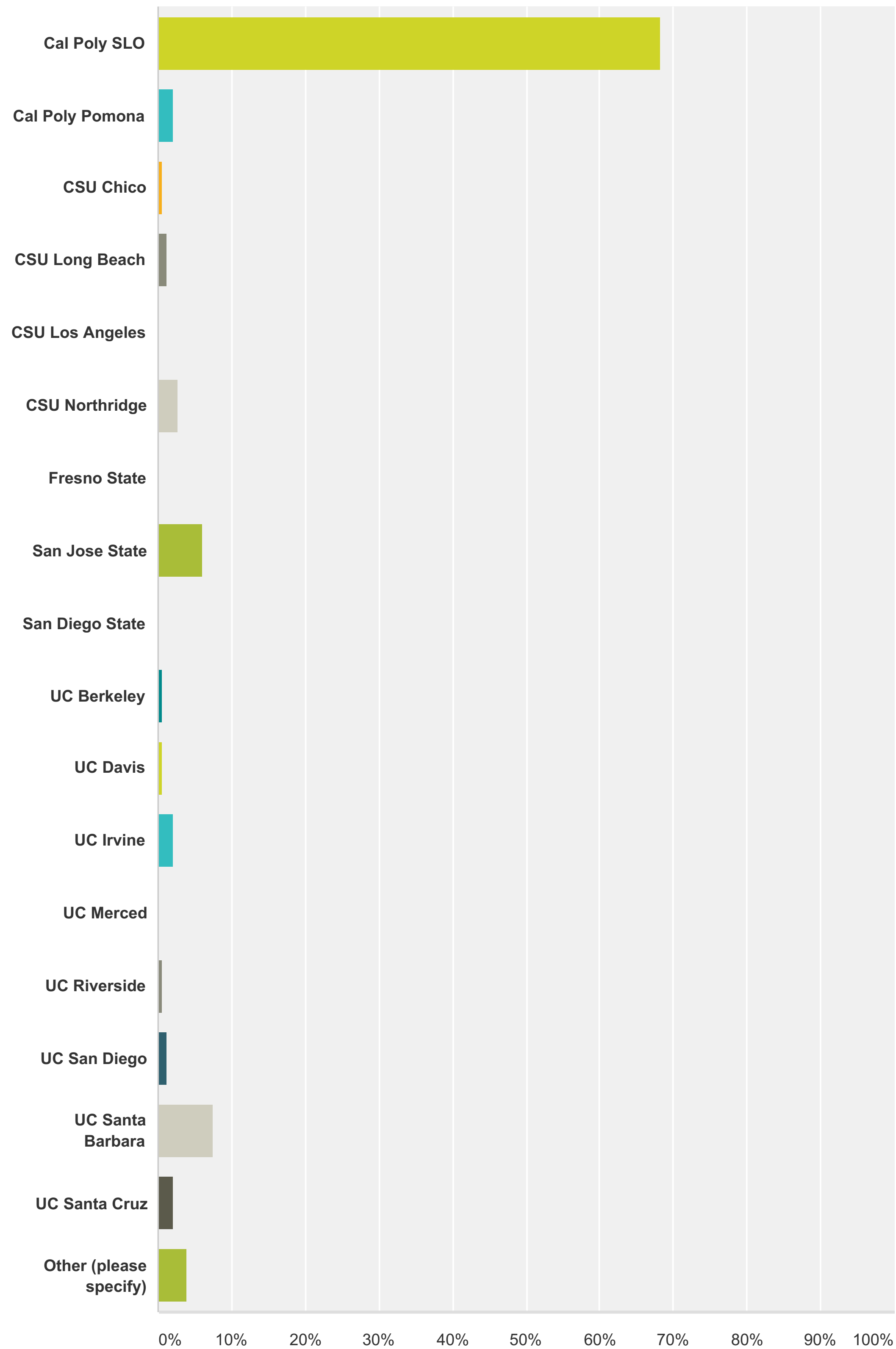


Answer Choices	Responses	
Architectural Engineering	**4.05%**	6
Aerospace Engineering	**4.05%**	6
Biomedical/Bio Engineering	**5.41%**	8

Chemical Engineering	**2.03%**	3
Civil Engineering	**11.49%**	17
Computer Engineering	**9.46%**	14
Computer Science	**1.35%**	2
Electrical Engineering	**17.57%**	26
Industrial Engineering	**3.38%**	5
Environmental Engineering	**1.35%**	2
Manufacturing Engineering	**1.35%**	2
Materials Engineering	**0.68%**	1
Mechanical Engineering	**33.11%**	49
Software Engineering	**0.68%**	1
Physics	**0.68%**	1
Other (please specify)	**3.38%**	5
Total		**148**

Q11 Where did you transfer?

Answered: 148 Skipped: 1

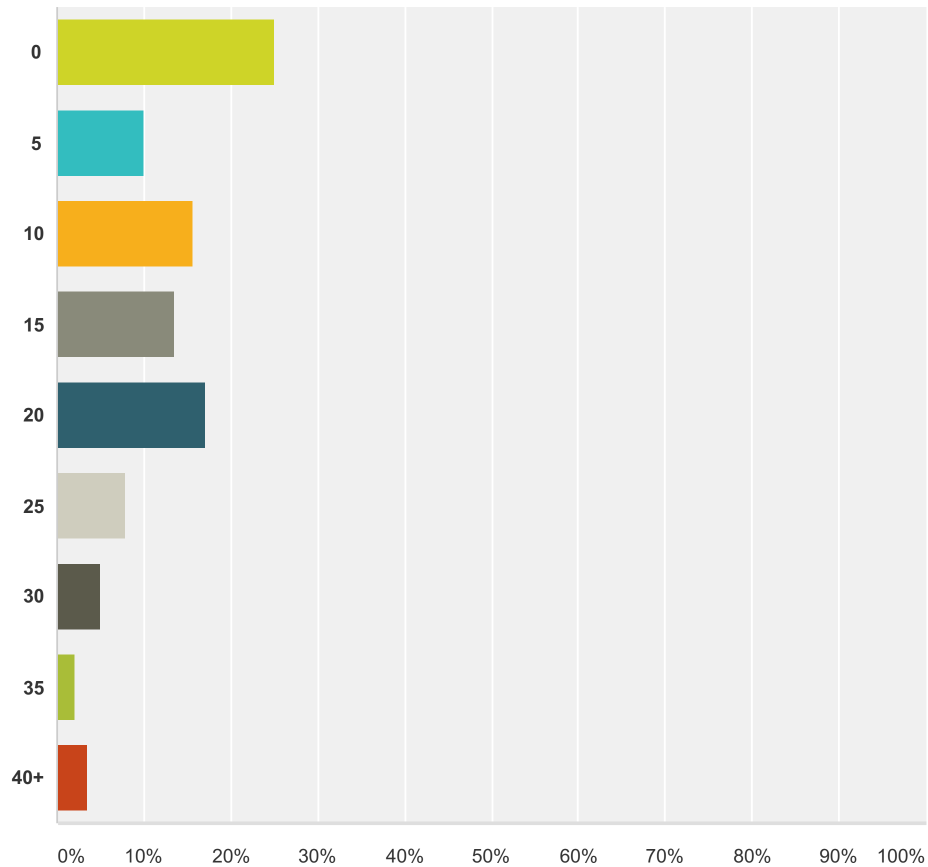


Answer Choices	Responses

Cal Poly SLO	**68.24%**	101
Cal Poly Pomona	**2.03%**	3
CSU Chico	**0.68%**	1
CSU Long Beach	**1.35%**	2
CSU Los Angeles	**0.00%**	0
CSU Northridge	**2.70%**	4
Fresno State	**0.00%**	0
San Jose State	**6.08%**	9
San Diego State	**0.00%**	0
UC Berkeley	**0.68%**	1
UC Davis	**0.68%**	1
UC Irvine	**2.03%**	3
UC Merced	**0.00%**	0
UC Riverside	**0.68%**	1
UC San Diego	**1.35%**	2
UC Santa Barbara	**7.43%**	11
UC Santa Cruz	**2.03%**	3
Other (please specify)	**4.05%**	6
Total		**148**

Q12 On average, while at your 4-year university, how many hour per week did you work? (round to nearest 5)

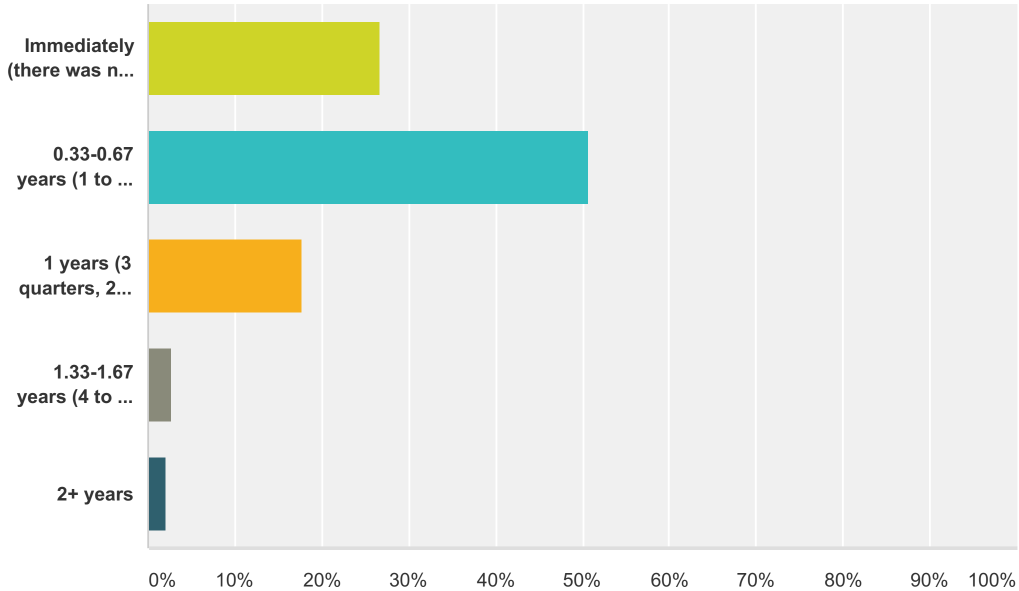
Answered: 140 Skipped: 9



Answer Choices	Responses	
0	**25.00%**	35
5	**10.00%**	14
10	**15.71%**	22
15	**13.57%**	19
20	**17.14%**	24
25	**7.86%**	11
30	**5.00%**	7
35	**2.14%**	3
40+	**3.57%**	5
Total		**140**

Q13 How long did it take for you to assimilate (become accustomed) to your 4-year transfer university?

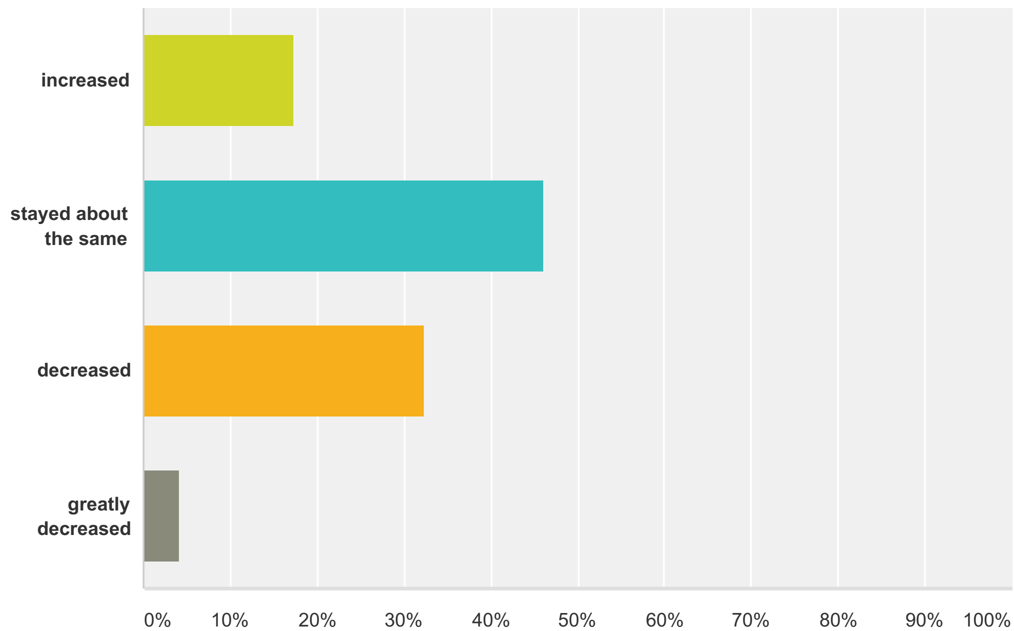
Answered: 146 Skipped: 3



Answer Choices	Responses	
Immediately (there was no "transfer shock")	**26.71%**	39
0.33-0.67 years (1 to 2 quarters, or 1 semester)	**50.68%**	74
1 years (3 quarters, 2 semesters).	**17.81%**	26
1.33-1.67 years (4 to 6 quarters, or 3 semesters)	**2.74%**	4
2+ years	**2.05%**	3
Total		**146**

Q14 Compared to my GPA at AHC, my GPA at the university:

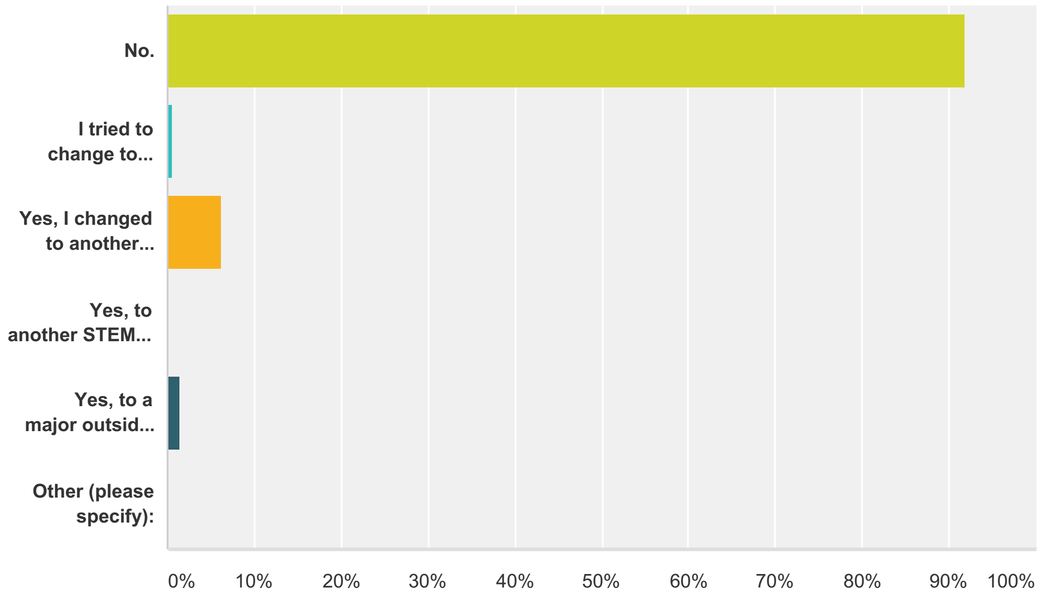
Answered: 145 Skipped: 4



Answer Choices	Responses	
increased	**17.24%**	25
stayed about the same	**46.21%**	67
decreased	**32.41%**	47
greatly decreased	**4.14%**	6
Total		**145**

Q15 Did you change majors after you transferred?

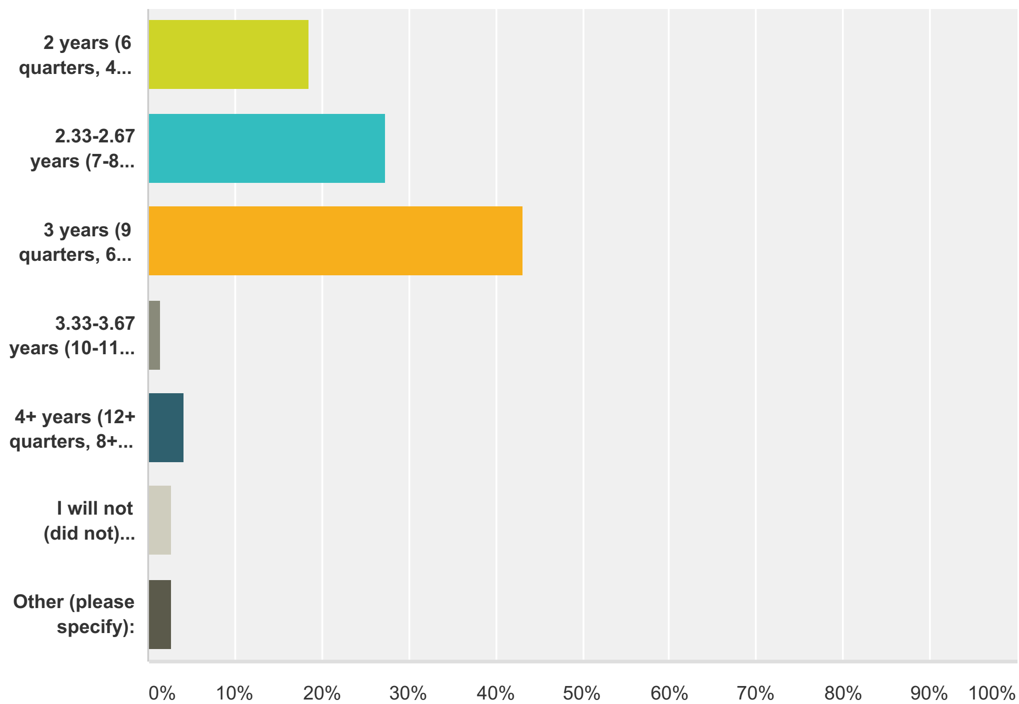
Answered: 146 Skipped: 3



Answer Choices	Responses	
No.	**91.78%**	134
I tried to change to another Engineering major, but was not allowed to. I stayed in my original major.	**0.68%**	1
Yes, I changed to another Engineering major.	**6.16%**	9
Yes, to another STEM major (e.g., science, technology, Mathematics, Computer Science).	**0.00%**	0
Yes, to a major outside of STEM.	**1.37%**	2
Other (please specify):	**0.00%**	0
Total		**146**

Q16 How long will it take (did it take) for you to graduate with a Bachelor's degree after transferring (academic years)?

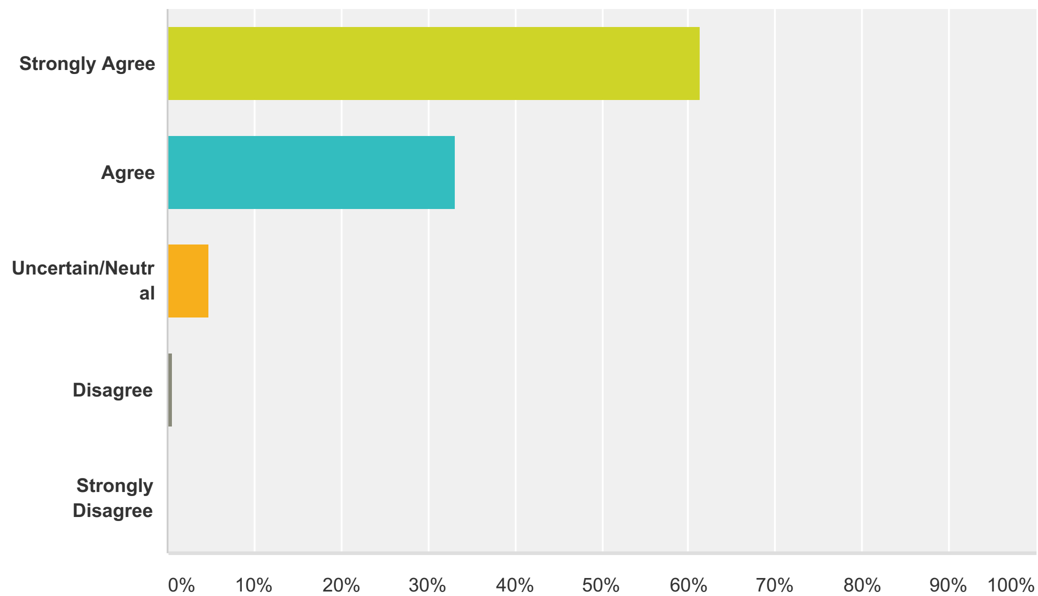
Answered: 146 Skipped: 3



Answer Choices	Responses	
2 years (6 quarters, 4 semesters, not counting summers).	**18.49%**	27
2.33-2.67 years (7-8 quarters, 5 semesters, not counting summers).	**27.40%**	40
3 years (9 quarters, 6 semesters, not counting summers).	**43.15%**	63
3.33-3.67 years (10-11 quarters, 7 semesters, not counting summers).	**1.37%**	2
4+ years (12+ quarters, 8+ semesters, not counting summers).	**4.11%**	6
I will not (did not) graduate.	**2.74%**	4
Other (please specify):	**2.74%**	4
Total		**146**

Q17 As a transfer student from AHC, I feel that I was well-prepared to succeed academically at my 4-year university.

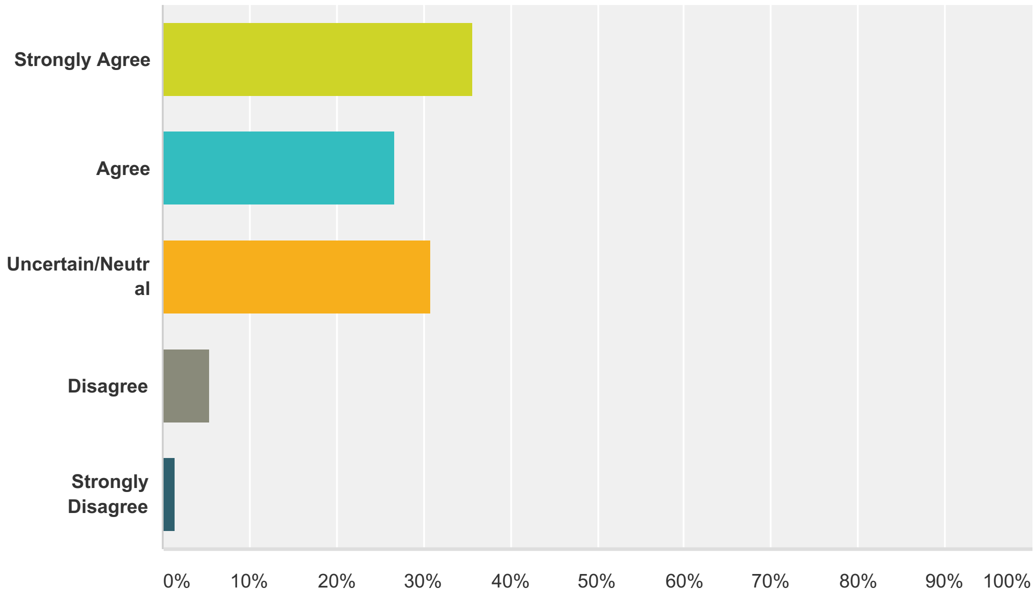
Answered: 145 Skipped: 4



Answer Choices	Responses	
Strongly Agree	**61.38%**	89
Agree	**33.10%**	48
Uncertain/Neutral	**4.83%**	7
Disagree	**0.69%**	1
Strongly Disagree	**0.00%**	0
Total		**145**

Q18 As a transfer student from AHC, I feel that I was better prepared academically than students who had attended my 4-year university since they were freshman.

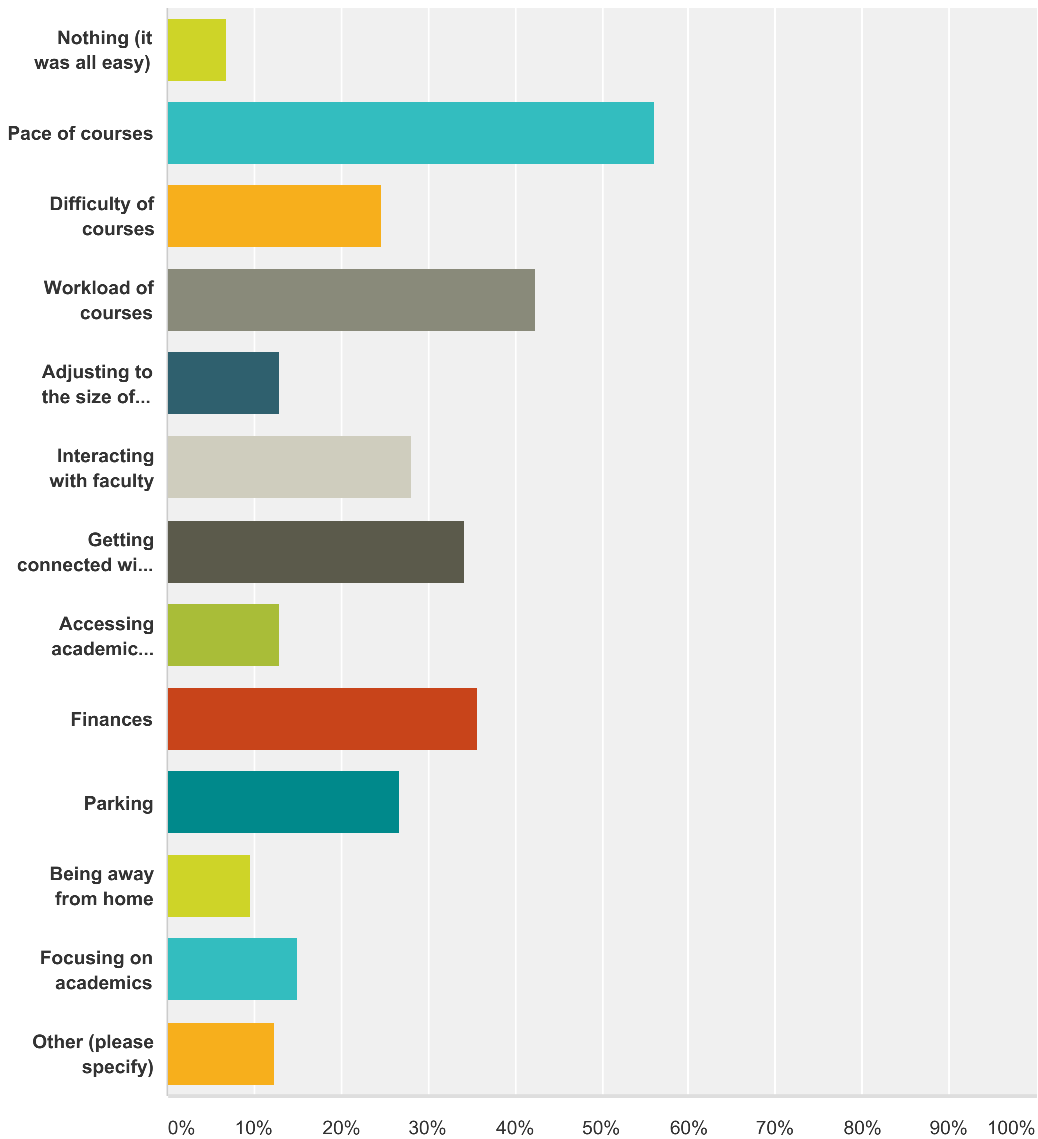
Answered: 146 Skipped: 3



Answer Choices	Responses	
Strongly Agree	**35.62%**	52
Agree	**26.71%**	39
Uncertain/Neutral	**30.82%**	45
Disagree	**5.48%**	8
Strongly Disagree	**1.37%**	2
Total		**146**

Q19 What was the most challenging part about transferring? (select up to 4).

Answered: 146 Skipped: 3



Answer Choices	Responses	
Nothing (it was all easy)	**6.85%**	10
Pace of courses	**56.16%**	82
Difficulty of courses	**24.66%**	36
Workload of courses	**42.47%**	62
Adjusting to the size of campus	**13.01%**	19
Interacting with faculty	**28.08%**	41
Getting connected with other students	**34.25%**	50

Accessing academic support services	**13.01%**	19
Finances	**35.62%**	52
Parking	**26.71%**	39
Being away from home	**9.59%**	14
Focusing on academics	**15.07%**	22
Other (please specify)	**12.33%**	18
Total Respondents: 146		

2015 AHC Engineering Alumni Survey - Fall 2015

149 Total Respondents, Nov 11 through Nov. 30, 2015

Compiled by Dom Dal Bello, via SurveyMonkey.com

Numbered paragraphs indicate a single response. Answers in each section are in order in which they were received.

Times mentioned (in narrative):

AHC 100+ Dom 24 Dal Bello 5 Jorstad 6 Rob (Meyer) 1 Metaxas 1 Philbin 1
Thank 9 Office hour 24 Group 26 HW format 4 Statics 4 Dynamics 5
Strength of Materials 6 Circuits 5 Excel 5 Matlab 5 SolidWorks 4 MESA 9
Engineering 97 Math 16 Physics 14 Excellent 14 Great 65 Awesome 6
Prepared (as in student *felt prepared*, not the warning "be prepared") 11

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20. What advice/wisdom would you give to a new AHC engineering student?

In order of response… Nov. 11 through Nov. 30, 2015

125 answered questions, 24 skipped question

1. Study
2. Make sure that you talk to a transfer counselor regarding the classes you need and not a general counselor. You do no need to take certain GE courses and your science and math courses will count for your GE.
3. Take as many classes as you can. I had to stay another year, because I didn't take 1 engineering class.
4. Have a passion for it, learn to love it
5. The engineering program at AHC is the best
6. Learn Strengths of Materials! Keep your grades up.
7. Focus here. It's ok to make mistakes while your here but don't get into bad habits.
8. Start early, stay focused, finish strong.
9. Take advantage of the labs and small class sizes while you can. Get used to interacting with professors, it will make it easier when you transfer. Try to participate in study groups even if you feel you don't really need it. One thing that I think it takes students a long time to realize is: You are not going to school just to pass a series of tests, so do not think that the point of each class is to prepare you for your midterms and finals. Focus on learning how you learn and the best way for you to acquire and retain knowledge, if you can do this you will do fine in both school and in your career.
10. These are the basics you will build the rest of your engineering career on, make sure to have a solid foundation in statics and dynamics, they will always come up again.
11. Get a planner and don't procrastinate
12. Visit Dom during his office hours to seek help.
13. Join MESA, utilize office hours, don't be afraid to ask questions
14. Appreciate your teachers. Teachers at a 4 year don't always care about the students understanding of the material.
15. Take as many classes as you can
16. Give time to the adjustment. Making friends will happen with time.
17. Take Jorstad for physics
18. If you struggle with calculus find a different major.
19. Rest. Don't try to do all nighters. Take as many engineering at Hancock as you can it is just as good and much cheaper

20. Try to focus on your core classes (math, physics, etc.) in order to do well and go into engineering classes well prepared.
21. Take all of the AHC courses available for your major. They are cheaper and the instructors at AHC are better.
22. Get more involved with MESA and interact with faculty
23. Make sure you learn the material in your classes well (as opposed to remembering 20% after the final). Once you transfer to somewhere with the quarter system, you take courses whose content you *will* be expected to use later. Thorough notes and worked out homework problems (as per Dom's homework format) really helped me refresh circuits material. Also, take advantage of the Project Design Lab class at AHC while you can to build something cool. I miss having access to such a well-stocked lab (I don't have classes which allow me access to one yet).
24. Community college is easy compared to university. Lots more of individual work. Make sure you understand well the subjects and go above and beyond your homework to be best prepared upon transferring. Students at university in engineering are very well prepared and playing catch up is a drain on energy.
25. Do your homework.
26. Do your homework
27. Study hard, attend workshops, former study groups
28. Determination is key. Complete as many general ed. classes before you transfer so that you can focus on your major specific courses.
29. Own your education. You need to want it for yourself.
30. Understand the basics first. Even take physics classes twice if you have to. It will make upper level courses much easier.
31. Everything you learn in your courses will come back in future courses. What you learn in the field of engineering is somewhat cumulative. What you learn you will use in the future, especially if you plan to be a practicing engineer. Try to understand as much as possible the first time around because it will make your life more simple.
32. Take advantage of all the resources that AHC has to offer. Form study groups and go to your instructor's office hours for help.
33. Form your study habits now before you have to in a four year university.
34. Take as many classes as you can at AHC because they only get harder and faster at CPSLO.
35. Study hard and learn all you can from the STEM professors at AHC. They are interested in your success. Much like it is in regards to learning math, you are learning the basic, foundational principles of your life career; learn all you can to prepare.
36. Take the classes as fast as they can be taken. Don't drop a class because you need an "A" and so you'll take it later. Don't take a semester off, it becomes three years off very quickly. Think, about everything, all the time, and never stop; understand the whole world around you. Don't yearn to be out of class while you are in it; you are paying to be there and should remain attentive the entire class period. Don't start packing up as the class nears an end, keep your notes open until the instructor stops talking and dismisses you.
37. Develop your study habits and become very disciplined. The person that studies correctly and studies often does well.
38. Be prepared to work hard.
39. Find a good group to work with. They will help keep you motivated and on track.
40. Go to office hours!
41. Learn and improve on your time management skills. Don't be afraid to ask for help. Create study groups to help each other out. Get use to going to office hours, professors are there to help.
42. Make sure to meet with a counselor from MESA. They now far more about the classes that you need to transfer into a STEM major compared to the regular counselor in the counseling center. Take at least 1 or 2 summer classes to finish faster. Don't work more than 20 hrs a week while being a full time student.
43. To try their best and to not give up. It's not easy but anyone can do it when you try.
44. Take as many of the Engineering courses as you can with Dom before you transfer. They all count toward your major (some will satisfy electives, others main required courses). You will have a much better foundation if you take the engineering courses at AHC. Get to know your instructors (you are going to need LOR from them, so make sure they know who

you are, and that you are on good terms with them). Really try to keep your GPA as high as you can (it opens up many doors in the future when applying for scholarships, internships, and jobs).

45. Well I remember when I first started at AHC I felt like I would never get out and I really just wanted to transfer already. So I would probably tell her/him to just take things one semester at a time. Don't overwhelm yourself trying to rush. Do the best you can each semester. If you have failures along the way, it's ok, you will learn far more from your failures than your successes. I failed several classes at AHC but I learned a lot about how to succeed from those failures and in the end I made it where I wanted to be (CP SLO). Also, I'd say take advantage of all your resources and ask for help when you need it. Do the best in all your pre-req and low level classes as mastering that material will only make life easier for you in your future classes.
46. Join/form study groups ASAP
47. Try to find out what the career will actually entail day-to-day and be realistic as to whether or not you will enjoy that work. There are many engineering options, so you don't have to settle. You can succeed - engineering is about problem solving which entails perseverance, hard work and dedication.
48. Use your time at Hancock to prepare for conditions at your transfer university. Develop good study habits like study groups, going to office hours, etc. Talk to your counselor a lot to make sure you're on track to transfer easily
49. The resources and preparation are at AHC, you just need to seek the help.
50. Study groups and study partners. Take a Computer Science programming course, you might like it.
51. (Dom, take snippets if you don't want to use it all)
    • Take the personal development class ASAP if you're unsure about which major you want, because it will help a lot in the future.
    • If you find other engineering majors in the same classes as you, start to network with them and see if they'd like to do study sessions, because it's likely they will be in all of your core classes till you graduate. Working with others to solve problems is very important, because it makes your brain think about problems in a different way, which will help greatly on tests.
    • Start out with one hard class, medium one, and then easy ones to build up to 2 hard classes and 2 easy ones per semester by the start of your second year. ALWAYS take a math class, because you'll need it and don't be afraid to talk to the teacher in their office hours for help.
    • The Professors don't really care if you ask a dumb question because that's why you're in school (to learn). ALWAYS ask questions if you get stuck and know you can't get any further, because resorting to cheating will cause permanent issues down the road. Only use solution manuals after you've done your work to verify you've done it properly. If you get stuck on operations for problems, consider buying Schaum's outline for that course, because it does step by step breakdowns on how to do problems with good explanations for major topics. Take advantage of Khan Academy, but don't skip classes because you have it, just watch the video before going to class so what the Professor does will make a lot of sense.
    • Get an electronic copy of the Engineer In Training (Fundamentals of Engineering) Reference Hand Book, which has a comprehensive amount of notes for each major. It's going to be intimidating at first, but it's extremely helpful for course work and the actual EIT/FE exam, which is a huge plus for the job market and internships.
    • Consider spending extra money ($20-$25 an hour) if you need a tutor and if AHC can't help with X class, get one at Cal Poly (Talk to the head of the dept as they are pretty nice and they will get you in touch with a professor who can get you a good tutor). If it means waiting an extra year then $150 a semester is a drop in the bucket to a year lost for a Job that could net you $50k to $75k. If money is a huge issue, look into finical aid and setup an appointment with someone in the department as there are tons of ways to get funded without taking loans.
    • Understand that PELL Grants count based off the amount of time you started using it, it reset at a new school but is also time sensitive.
    • While advisors might be helpful for picking out classes, talk to an Engineering Professor and have them show you what your "core" classes are and when they are taught so you can generate an excel spread sheet showing which classes you'll take each semester (have

a backup class if you can't get it) to see how long it'll take to transfer.
• If you feel you have trouble in classes or issues taking tests, head over to the learning assistance program to get tested and see if you can get double test time (it's extremely useful). Identifying a learning disability is ASAP is key to your education as you can treat it sooner and it won't hold your grades back.
• You can take summer classes at Cal Poly by getting the professor's permission and department head's signature. A temp transcript showing the assist.org correlation is enough for them to accept you if the class isn't full (I only recommend high level ones that will hinder your ability to transfer for an additional year).
• (Dom I feel like they should be made aware of this) While getting as many classes done before transferring is important, it's not fully necessary depending on the school you want to go to. The department head of the Mechanical Engineering at Cal Poly – SLO has said multiple times that if you have all most of your core classes (At least statics, circuits, chem, physics, and multivariable calculus done then they will accept you if they aren't impacted). Why is this a good thing? Well at Cal Poly the quarter system basically takes the core material you need for your major, packs it into 10 weeks so you don't go in depth about content that irrelevant to your career (it's nice to have, but not necessary). Hancock will give you 16-18 weeks' worth of content because the class is meant to satisfy the requirements for many different majors at once. After 12 units at Poly you pay no extra so if you have a ton of simple classes without outside work then go for it, but don't do it for every quarter because you don't want to get burnt out.
• By starting the core classes as soon as you get to AHC you more likely to get a local internship if you look at local engineering companies. Take SolidWorks or PTC Creo computer aided modeling classes early as it'll make you more desirable for a lower level internship (you're not far along so take anything you can get so you 'll have a little bit of extra cash, something for your resume, and hands on knowledge for future internships and potential jobs) and make sure you ask family members if they know engineering friends that can help you get your foot in the door for an internship or interview (you don't realize how important having connections is at a young age, but it's very key if you can get them).

52. Ask tons of questions of you professors. Hancock is a great place to try different disciplines and figure out what you want to do. You really can't do that at a 4 year college.
53. Take as many classes at AHC before you transfer
54. Don't change your major just because you fail a class.
55. Never Give Up, during school take life one day at a time.
56. Even if it takes longer than you want, stick with it and keep going!
57. Keep all your old engineering notes they become handy.
58. Take as many eng classes before thinking on transfer, the more work you do while at AHC the easier the rest would be. Find your own learning style and stick with it. Do not overload yourself trying to "finish faster" this classes are fundamentals that are key for success. Balance/mix your class selection with non-engr. learn other skills public speaking, team work. Use ALL faculty Office hours specially if struggle. Do use all the resources available math lab, tutors, homework club.
59. Plan your schedule for every semester
60. Do not procrastinate. Read ahead of lectures. Stay focused. Get involved in internships in your field of interest.
61. Talk to your teachers, and ask them for advice. AHC faculty really cares about your success and you won't necessarily have that support again.
62. Know that this is what you really want to do. Take a class or two in engineering and if you struggle change major, a C is not enough to be successful in engineering.
63. To learn more about the desired engineering field. It should allow them to know what it will be about and if they can stick with it.
64. Know your limitations. Do not take too many classes at once. Enjoy your time at Hancock.
65. Interact with instructors (go to Office hour to ask questions). Take as many as classes you need.
66. Learn to manage your time and money wisely, both will be important when you transfer. Also get involved with projects, either at

school or independently, that are even the slightest related to your major.

67. Work hard and get it done fast!
68. Learn material well and review after your classes are done because you'll need it later
69. Take the time to learn how to become a better student.
70. Take it serious from the very first class and focus on learning skills. The course content is only part of the puzzle, but the skills you develop to learn and solve problems is what an engineering education is all about.
71. Study to learn not just to pass the tests. The better you truly comprehend the material, the better off you will be in the more advanced courses.
72. It's a great program that will prepare you academically to meet the expectations of the larger universities.
73. Stay on top of work load. It is easier than trying to catch up once fallen behind.
74. Work Hard, be diligent with homework!
75. Every student begins at a community college for one reason or another. NO matter the reason work hard, take pride in your work and don't ever lose focus on the mission you have at hand.
76. Engineers don't get paid enough.
77. Study hard
78. Value the time and effort your professors put into the courses. Do the HW ......all of it! And then practice extra problems. Use office hours. Don't be afraid to say you don't understand something.
79. Do not fear the workload you battle in AHC, for the war is won in University, and you are merely sharpening your tools for the larger battles ahead.
80. Do not procrastinate on anything. Get everyone completed early and verify it works before thinking you are done. Everything will have issues and you don't want to be surprised by them when you do not have time to fix them.
81. Take advantage of the Science, math and engineering faculty/courses at AHC engineering.
82. If you are determined enough to succeed, you will succeed. The hardest part is just believing that you can be successful. You have to continually work to be improve regardless of what grades you get. It's not just about being "smart" or having talent or natural abilities. It involves commitment, determination, personal responsibility, and motivation. Don't use the excuse, or believe in general the reason why so and so gets good grades or is successful is because they are smart. That is a cop out. It also took work ethic. Work hard to learn the material and you will do well in your classes.
83. I would recommend them to actually learn the material and not just treat it as something you have to get through. This mainly applies to the engineering classes. Learn your statics, dynamics, strengths and materials, material science, and circuits courses. It not only will help when you transfer, but also in industry. Also, don’t take Dom's teaching for granted. You will miss him once you transfer.
84. Do all your work and don't try to skate through your classes. These are the foundation of later classes and they expect you to know the basics. Very little review time.
85. Reach out to MESA, attend workshops, ask questions, go to office hours.
86. This is obvious, but learn this material as well as possible. It will rear its ugly head back again. Seriously.
87. Procrastination equals failure.
88. Treat all STEM courses as equally important. Even something that does not seem to be important while you are enrolled in it will come back into use in the future.
89. Develop good study habits
90. I don't think there is enough material that describes each engineering major specifically. As soon as I transferred, each major had a very clear definition along with specific career goals.
91. Get into study groups, ask questions and use the instructors office hours
92. Although it may seem tough at times, it'll be worth it at the end.
93. Don't stop. There is an end result which you will reach if you keep trying.
94. Approach it with the professionalism and dedication you will have at your future job and you'll do fine.
95. Make friends and always talk to your professors
96. Be passionate about your career choice
97. Learn the basics inside and out. Try not to leave all the core classes at the end so you don't have to take all the upper level math

and science courses at the same time. Everything gets harder and builds on what you'll learn now

98. Stick with it, the degree is worth the work.
99. Study hard, pay attention, ask questions, be social, enjoy the experience
100. Take it seriously, don't let the semester length lull you into getting behind.
101. You are capable of doing it
102. Work hard
103. Work on making good study habits. Go to tutoring and office hours.
104. Pay attention, AHC engineering prepares you well to transfer.
105. Complete as many engineering classes as you can at AHC, you won't find their array of engineering classes at many other junior colleges.
106. Enjoy your journey and start off strong, because your GPA matters when you plan on transferring.
107. Take the Excel and Matlab courses
108. The program gives you all that you need to be successful if you are willing to put in the time and effort to learn the material.
109. Take all the classes you can at AHC before transferring, they are very good preparation.
110. Be curious and don't be afraid to ask questions in class - It's the best way to learn! Don't get so down on yourself for a poor exam or homework grade here and there. Focus on trying to understand the concepts so you can move onto the next subject. Make sure to take good notes, and keep your textbooks to reference in the future. Most importantly, find things that interest you and don't forget to HAVE FUN!
111. Don't treat AHC as High School 2.0. The course work you will receive here has the same content as a 4 year university. Unlike a 4 year university, the class sizes are much smaller and more personal. Capitalize on this, and you will be very well prepared to excel at a 4 year universality.
112. Don't transfer to a private school. Especially if the transfer agreement is outdated or be prepared to petition to get every single credit to count for your degree.
113. Do not get G.E. certified. This makes it rough because about the only classes you have left to take are major-specific classes. This allows for a more balanced course load.
114. become part of a club. it helps to have a support system that you can count on.
115. Take as many lower division classes. The quality of lower division classes at SJSU are a joke compared to AHC because the focus on upper division and grad classes
116. Take advantage of your resources. Take as many classes as you can.
117. Go to office hours as often as possible. Take courses that seem interesting to you, even though they aren't in your transfer curriculum; it's cheaper to expand on your classes while attending AHC than taking them at a 4-year.
118. Take as much as possible at AHC. Having to take lower level courses in your last couple quarters/semesters is quite a drag.
119. Save all of your books and get as much coursework done at AHC as possible (even if it takes longer).
120. Take advantage of professors office hours
121. Ask questions and GO TO OFFICE HOURS. The teacher's are more than willing to help and you get great one-on-one help there. Work in groups as well...I always did better in group studying than alone. Talk the material out with other students.
122. Develop good interview skills and resume
123. Research your engineering/science major thoroughly. Make sure it is something that you're truly interested in and willing to sacrifice for.
124. Learn good study habits and time management NOW if you haven't already.
125. Don't be afraid of the coming mountain of work and lost sleep. Plan a year in advance, then just take one day at a time. Work your ass off, and you won't regret it, but don't work so hard that you hate your life. DON'T SKIMP on the lab reports! They're more important than you realize: for practicing real-world communication, for demonstrating to employers in job interviews that you are worth something. Apply what you are learning to personal projects outside of homework, where time permits.

21. What advice/wisdom would you give to an AHC engineering student who is about to transfer?

In order of response… Nov. 11 through Nov. 30, 2015

121 answered questions, 28 skipped question

1. Stay focused when you get there
2. Transfer in the fall and not in the spring. You will find it difficult to adjust mid year. Also there are a lot of financial aid and scholarship restrictions when transferring mid year.
3. Map your academic career as thoroughly as possible and communicate with faculty as much as you can.
4. Learn how to ask for help when needed
5. Nothing, if you did well in AHC you will do just fine in a 4-year university
6. Remember Strengths of Materials! Also, consider participating in clubs because they are a great way to fatten your resumes with skills.
7. Don't give up. It's gonna be hard but it should so don't give up. You can finish.
8. Get to know other transfer students, they are in the same boat as you.
9. Do not get too stressed out about the transfer process it is normal for your GPA to take a hit in your first quarter(s). Try to meet people who are more familiar with the campus and the services they provide. Large classes can be stressful at first, but it's really no different than a smaller class. Discussions are sometimes unnecessary. Never ask a professor if what they are saying is going to be on a test. This is essentially like asking someone if you should pay attention to what they are saying.
10. Orientation, ask for help and make sure you know your campus, there will always be a discontinuity between your classes and where the new school picks things up.
11. Don't rush (frat/sorority). Do your coursework immediately
12. Get plugged into student groups within engineering at your transfer university
13. Meet people, study in groups, and network
14. Be prepared to pay much more for much less.
15. Once you transfer check with you counsellors to see what courses transfer over. Be prepared to make copies of old syllabi
16. To find support groups at the new institution and get involved with professional organization or some serious fraternity/sorority.
17. Do your homework and find a group of people in your major to study with as quick as you can
18. Find study groups, Seriously friends help
19. Go to office hours
20. Be prepared for a faster, heavier yet not necessarily harder workload.
21. Be prepared for the increase in workload
22. Be open minded and be prepared for bigger loads of work.
23. At least for computer science and engineering disciplines, start doing projects related to your major (if you haven't already). They deepen your understanding of specific topics and help you determine whether to continue doing it or switch to another engineering major. Also, join clubs related to your interests after transferring; some of them even do hands-on engineering projects.
24. Get involved. Attend orientation. Make a support group.
25. It's very fast paced and expect to feel stressed out at first, but it will get better once you are used to the quarter system.
26. prepare for long hours
27. Get connected
28. Switching from a semester system to a quarter system is a huge change of pace. Manage your workload and do not procrastinate as it is easy to fall behind.
29. Time management and living a healthy lifestyle is key!
30. Don't take detailed notes. Always pay attention to the professor and really try to understand the subject. Only write down key points. The rest is in the textbook.
31. Be proactive, get involved. There's students who can't find a job, I think finding a job is proportional to your effort. A job position will not come looking for you, you have to look for a job and demonstrate why you are the right

candidate. Start networking as soon as possible.

32. Be prepared for a fast paced and intense environment. Be aware that access to professors is limited and will most likely be unsatisfactory.
33. Take part in the university, not just worry about graduation. Join clubs, do research, and just take part in events.
34. Keep your notes, not all classes are the same but many build off your classes at AHC. Study don't party during the week.
35. Don't lose your focus and motivation. A new scene and pace may shake things up a bit, but keep the same intensity you had at AHC, and you will be successful at 4-year.
36. Now you are paying even more money to be in a class, get your money's worth; don't act like you are anticipating the end of class and packing up early. Be disappointed there is no more time when class ends. Don't complain about professors that expect a lot out of you, you should expect a lot out of you. Don't whine that your professor has a difficult accent; if a man can grow up in Russia and learn imperfect English and teach math classes in America, then it is because he really, really knows his math.
37. Don't be afraid to communicate with the departments at the school you're transferring to. Ask a lot of questions and do your best to figure everything you need to do.
38. Don’t expect tests to be as doable as in AHC, in a 4 year university tests are made as hard as possible to keep the averages down, so be prepared to study a lot harder.
39. Don't stress the change. If you gave a good effort at AHC the shock at university will be minimal. AHC does a great job of preparing you.
40. Go to office hours!
41. Be prepare to spend times in the labs. Join clubs and organization, but make sure that they aren't taking a lot of your time. Time management is important. If you can get by without working, I recommend you don't work while attending a university with a quarter system. If you need to work don't work more than 20 hours.
42. Join a club like Society of Hispanic Professional Engineers (SHPE). It's a great way to meet new friends and create study groups.
43. Don't be scared but be prepared. Try to acquire the necessary textbooks before class starts and start reading a month before school starts.
44. Form good relationships with your new instructors, go to their office hours. They will prove very useful and important when applying for scholarships, finding internships, making contacts, applying for a master program, choosing a project, etc. Join clubs (primarily for the scholarship opportunities), there are a lot of clubs giving out a lot of money and all you have to do is apply. You won't have a lot of time to participate in clubs, but make sure you help out at least once with some kind of big event so you can put it on your resume and mention it in your scholarship personal statement). Get to know your fellow students (they will be a life saver when doing HW, obtaining used school books, etc.).
45. Everything will fall into place! As long as you do the necessary things to prepare yourself and you set yourself up for success, then all will be well. Things are different at first at the university (class pace, workload, etc.), but if you took advantage at AHC to prepare yourself, it's not too much harder to succeed at the university then it is AHC.
46. Even if you don't need it, attend office hours. Rapport with faculty is paramount to internships, recommendations, etc.
47. If you can take a break from work the first semester, then do it and figure out what works best for you. Secondly, I did just as well or better than students who started as a freshman at the 4-yr university. AHC will prepare you for the university.
48. Be prepared for a possible change of pace at your new college, like the quarter system vs semester. Expect classes to get harder the farther you go in engineering, so develop good study and hw habits now.
49. If you have a decent GPA, you will be fine. If not, you will need to apply yourself more.
50. Quarters are better than semesters (no 11th-week wish-it-would-end feeling), as long as you don't fall behind! Also, study partners/groups.
51. Be sure to check and double check that all of your engineering courses will correctly transfer over to the 4-year university you plan to transfer to

52. • You can take summer classes at Cal Poly by getting the professor’s permission and department head’s signature. A temp transcript showing the assist.org correlation is enough for them to accept you if the class isn’t full (I only recommend high level ones that will hinder your ability to transfer for an additional year).
• First off get the hive mind attitude out of head as soon as you transfer and understand where your major gathers to work on stuff. Trying to work with a limited number of transfer students will hurt you a lot in the long end as getting connections with other students in your major is key to success (you and your fellow transfer students can still work together but integrate yourselves amongst your major as well, because it’s a lot more fast pace and you’ll have other students giving you different perspective on problems as they were likely taught the same material in a slightly different manor.
• DO NOT solely rely of engineering advisors to get your schedule in order. Work with your department head based off the road maps they generate so you can get advice on which professors would be best to take based off your learning style. Why is this key? They know which classes are being taught in your major, what’s being dropped, and what’s being added (this is extremely useful for impacted classes).
• Use your Priority Schedule Passes at a 4 year university wisely as you want to use them to take electives for your major, because they are career boosters and they also get camped out by master’s students who have auto priority.
53. Really plug in and apply yourself as much as possible. The more skills and experience you have when you leave Hancock the better since it only gets more challenging after you transfer.
54. Don't get distracted, keep your eyes on the prize
55. Try to get an internship as a community college student so that It will be easier to attain one after transferring and therefore have a better chance of finding work right away.
56. N/A
57. Go and explore the campus/city that you're transferring too so you get a costume to it. Make sure you go to office hours they help a lot .
58. Know your degree flow chart and be familiar with "petition to articulate" forms have the ready since day one. Apply to ALL the scholarship you come across and when you think you have ask your counselor for more. Do check the box to be part of MESA. Be ready to get out your comfort zone
59. Arrive early anywhere you have to be. Do not neglect your reading and grammar skills. Work harder than what you think is working hard.
60. Talk to your teachers and hope they are as helpful as AHC professors.
61. Make sure to balance life, school, work, and/or family. Take is slow, don't rush to finish, don't overwhelm yourself with too many units. Take what you realistically can handle.
62. Get to know the professors, participate in study groups, and tutoring sessions.
63. Make sure to go to visit the school you are transferring and join a support program such as SHPE or IEEE. Look for housing in advance if you are not planning to dorm.
64. If you transfer to a quarter system university, don't fall behind at the beginning. It's really hard to catch up in a quarter system.
65. My advice would be for them to review. You don't have to know very little fact but knowing the major concepts (the fundamentals) will make life easier when you transfer. You not only have to know how to solve problems but you will also need to solve them fast.
66. Be confident with your work.
67. review your material for classes you're about to take that are continuations
68. Do the universities week of welcome. Go to office hours. Get involved in projects.
69. Take the time and seek out advice on time management and determining priorities. If you want to go to grad school or do research look into that day 1 and work toward. If you want to get a job then seek out opportunities to meet industry members and work toward that. Whatever your goal set a path from Day 1 and don't limit yourself.
70. Be mentally prepared and stay focused, it doesn't get any easier.
71. Not all teachers have as good intentions as Dom. Some bored, tenured professors make their classes pure tests of your willpower rather than focusing on academic goals.

72. Do not let courses intimidate you. Don't be shy to get help and see teachers during office hours.

73. Do not procrastinate with assignments. Get them done early! If you cannot teach/explain a homework problem or assignment to other students, you don’t understand it well enough.

74. Be open minded for cultural shocks. Santa Maria is a small community compared to the world around it. Embrace every opportunity and even at times when you don't succeed take something from the opportunity to help you grow as a son, brother, peer, colleague or husband.

75. Study hard

76. Depending on where you transfer, be prepared for a change in pace. If you transfer to a quarter based institution realize that you will need to adjust to learning less material per term, but at faster pace. You will need to adapt to different teaching styles rapidly since you only have a couple of weeks before the first exams, and ten before the course is over. At Hancock you have the luxury of not having to worry about the quality of the instructors - they are all great - at a large institution it IS MOST important to get a heads up from upper classmates who can steer you towards good professors and away from those who will waste your time.

77. Get comfortable with the good habits forced upon you in your AHC engineering courses, take those good habits with you to University and you will be served with good marks and respect.

78. 1. Pick your roommates/friends wisely. Their bad/good habits may rub off on you. 2. Do not be afraid to ask a question because many others probably have the same question. Seriously, I would rather have my class mates think I'm dumb but understand everything than have them think I am smart and struggle.

79. Apply for scholarship and try to connect with students who have transferred to the institution of interest

80. Work in teams. This is absolutely crucial. I can attest to this. My first year I studied alone. I struggled just to get through homework assignment. I spent way too much time on the homework. This year I have been working in groups. Even the stuff that I know I can do on my own. My study time has decreased. My understanding of the material has increased and my grades have drastically increased. Work in teams. Absolutely imperative. I didn't take heed to that advice and I paid a negative price for it. Also, I worried a lot. I had feelings of inadequacy, but even after my first day there the feelings of worry went away. So I'd say don't worry so much because everything will fall into place.

81. If it applies to your major and you're planning on transferring to Cal Poly SLO, make sure you take Strength of Materials because it is divided in two courses there and you can knock out two courses in one course at AHC.

82. Join clubs to get to know people

83. Get involved, participate in organizations like MEP/SHPE, be smart about time management.

84. Start off with momentum because an object in motion tends to stay in motion, especially academically.

85. Spend time learning Matlab. Continue using Dom's homework format as well as engineering paper.

86. All students do this act where they assess how much work each class is going to be and then allocate what they feel is the appropriate amount of time to those classes. I have felt it is better to over-study in the beginning and then ease off as you get to the point where you can accurately gauge how much work each class is going to be. This is because your "gauge" will not be accurate when transferring to a university since things are a little different. Also, don't let the horror stories about the difficulty of classes at a university scare you. I've had classes at Hancock that are tougher than upper division aerospace courses at Cal Poly.

87. Get involved with clubs

88. To remember that the end goal is not to transfer, but to graduate and succeed as an engineer.

89. Buckle down and get it done

90. Don't let yourself be scared about the transition. You earned your spot to be there. Use all of your study skills and manage your time appropriately.

91. Enjoy your time in school (especially in your engineering classes) because work isn't nearly as fun, though money is nice.

92. Approach it with the professionalism and dedication you will have at your future job and you'll do fine.

93. Do your research and be committed to your end goal
94. Review the basics, make sure you know exactly what courses you need so you can go as smoothly as possible.
95. When you get into the industry, the school you graduate from doesn't matter as much as how you present yourself.
96. Is not as bad as it looks. Take it serious, but also have a lot of fun. Meet people, start making connections. Some of these individuals have the same goals as you, and can make the ride a lot better.
97. Talk to counselors, understand transfer students get a priority time for registering for classes, don't assume things will go as smooth but don't panic, ask questions, talk to teachers, join clubs, enjoy it
98. Start paying attention to which classes you DON'T want to have to take a 4 year (I.e. because they're impacted and hard to get) and take the AHC classes that replace them
99. Don't let the stupid little honor students at your new school get you down
100. Get ready, classes will be a lot harder
101. Get ahead because it is very easy to fall behind. If you have labs in your classes make sure to communicate with your lab partners. Communication is crucial when working with lab partners.
102. Keep course, you've already knocked out two years and have the building blocks for all engineering classes at a 4yr.
103. Your almost done keeping pushing yourself and continue to work hard for what you want.
104. Learn to be able to take tests fast and be careful and which teacher you take. Start managing your time now and studying hard.
105. This program does a fantastic job academically in preparing you for 4-year university courses.
106. Reach out to other students and get into study groups.
107. Know that you've got a first-class science/engineering foundation under your belt, and don't think you're at a disadvantage relative to those that started university as freshman. Often grades are determined by fewer exams and assignments, so put in your study hours and make them count. Form a study group/buddy ASAP after starting a class. Make sure to register for classes THE MINUTE they are available.. Often there are too few classes to accommodate the number of students. If you are on the wait-list for a class, KEEP GOING to the class, for as long as 2 weeks after classes start; often most of the people on the wait-list don't bother, and there are always several who drop the class. Plus it shows the professor that you are motivated to be there. Try to get internships via school career fairs - they will really help you stand out. If you aren't able to get an internship, consider taking a class or two over summer to make your next semester/quarter more manageable.
108. Don't sell back your books. They may not be available at a 4 year, and re-learning a new book to reference will only add to your workload.
109. If you can avoid a part time job while taking classes start the University do so. The extra time requirement made it difficult.
110. Make sure you are ready to transfer if you are going to Cal Poly. Do not be in too big of a rush.
111. focus on your academics, take out loans (in moderation).
112. Look up the required courses and make a plan to know how much longer it'll take to graduate. I ended up having to take really easy classes because there was no articulation from AHC
113. Don't rush through your college experience. Take advantage of as many resources as you can.
114. Review your programming material if you are transferring into a Computer Science major.
115. Nothing is that strikingly different from AHC to a 4 year. You still go to class, do coursework, study and take tests. Don't get lost in the small differences and remember it's all worth it.
116. Be ready for the change in pace and less than excellent instructors. Every STEM instructor I had at AHC ranged from good to excellent, but in university you're bound to get some professors that are lack luster (if not just plane bad).
117. Make connections because someone may transfer with you and it's good to know someone when going somewhere far away
118. If you are doing well in Jorstad's physics classes and Dom's engineering classes, you can do anything at the 4 year level.

119. Make good relationships with professors and advisors

120. Staff at Hancock do an excellent job at building a strong support system and making you feel at home. Be prepared to go out of your comfort zone when you transfer and don't take on too much too soon to avoid being overwhelmed.

121. Buckle up. Academic life is about to surge forward. Plan on working harder and faster than you did at AHC, and it will be a rewarding experience.

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22. Other comments about the AHC Engineering Program.

In order of response… Nov. 11 through Nov. 30, 2015

99 answered questions, 50 skipped question

1. The engineering program gave me the basics needed to succeed at the university level. Basics in engineering, math, physics and science are needed to succeed in major courses.
2. I wish i could have earned a BS in Mechanical Engineering at Hancock
3. I felt more prepared and farther along in my education than other transfer students.
4. Use the resources that are free as much as possible. Office hours is probably the best and good habit to get into.
5. Overall I really enjoyed the program. I feel I was better prepared than most of my classmates that had started out at university. The only real problem I had is that it took longer than I would have liked to transfer (sometimes due to class availability). It may be helpful for students who transfer if there were more collaborative projects and assignments.
6. Excel, Matlab, and lab view will be your best friends
7. Overall I thought it was great
8. Dom did a great job while I was a student. He was a great resource
9. None
10. I feel the load was on par to the load at the 4 year institutions. As students, we did not know how good and new some of the equipment was at AHC.
11. NA
12. Instructors are very knowledgeable. Workload prepares you for related classes further in your academic career
13. I wish the AHC program could become a 4 year program
14. It is an Excellent program that needs to recruit more students so they can take advantage of it.
15. The rigor and content of engineering courses at AHC prepared me well for UCSC. My workload per major-related class is much lower than it was at AHC (even if they are lower division at the moment). The discrete mathematics course at AHC doesn't cover as many topics and doesn't focus on proofs as much as the course at UCSC, so I'm retaking it here. UCSC also groups statics, dynamics, and strength of materials into one class; I think I would only get credit for that toward Robotics Engineering if I took all three AHC courses. That's something advising might want to know.
16. Dom is awesome :)
17. The best around
18. Dom is the best!
19. This program is awesome. My teachers at AHC were far better than those at Cal Poly on average, and the classes were at a much easier pace. If AHC was a 4 year I would have stayed there.
20. Professor Dal Bello is a great instructor. He really tries to make students understand and cares that we learn.
21. I have nothing to say but good things about this program. I was well prepared for UCSB and I felt that the staff really cared about all the students.
22. I preferred the AHC program better than the UC Davis because the content was clear and challenging in AHC.
23. Great program. I was apart of the beginning and don't think I would be where I am today without Dom's help.

24. AHC Engineering teaches better than even some engineering departments at certain 4-years. I benefited greatly from AHC Engineering.
25. I would probably have saved some time if I had seen this http://flowcharts.calpoly.edu/downloads/mymap/15-17.52MEBSU.GENMEU.pdf and especially so if I had seen one with the critical path highlighted, as the intro to ME for transfers class has and gave me only after starting the first quarter. But then, I also never went to the transfer center at Hancock, so I am really to blame; but that would have been good to have. I am only in my first quarter at Cal Poly, but it seems most of these classes could have been taught at Hancock perfectly well; there is really nothing special about a more expensive campus that is essential to higher level classes.
26. The AHC Engineering Program will prepare you for University classes.
27. It is a great program!
28. Fantastic program. I speak highly of it in school and at work. I would likely recommend an incoming freshman to attend AHC instead of a 4-year for their first couple years.
29. Thanks Dom! Not sure if I've been able to thank you, but I was genuinely just a prepared as my fellow students upon transferring to Poly. Your lower division engineering courses were great.
30. Great program to be a part of. It prepares you for a 4 year university
31. Tailor some of the required courses at AHC to meet other schools required courses not just in particular Cal Poly SLO. (i.e. ENGR 100 at AHC could should meet the requirements to transfer to CSUN ME101.
32. It's an excellent program with magnificent teachers. I would only suggest to have all physics classes offer every semester.
33. I am really glad that Dom emphasized teaching us how to properly write a lab report and use correct HW format throughout our classes. I have never forgotten his tips and comments and it's because of him that I know how a lab report should be written and by second nature do HW in a format universally accepted by instructors. Senior students at my 4-year university don't know how to properly write a lab report and it is really sad. For an engineer you will have multiple labs that will require writing skills, and it made my life so much easier learning early on how to properly write one. I don't think adding a separate class to the program would be a good idea for teaching students how to write a lab report (because it will add another course required to take before graduating/transferring, possibly extending their stay at AHC, and because it will be a one-time class that they will easily forget about once they pass) but rather, do what was done for me, continually emphasize the correct way to write a lab report early on in the program and throughout it so that they will be fine-tuned by the time they transfer. Same applies to HW.
34. The engineering program is great. I ended up switching to Computer Science right before I transferred and I wish that there was a little more connection between the engineering program and CS program at AHC (although I don't know how that would work out.). It would have been nice if there would have been a little overview of programming in the Unix environment in the CS classes at AHC as this is HUGE at Cal Poly SLO.
35. I loved the AHC Engineering Program, and would take the same steps in going to AHC and then transferring to a university.
36. It's awesome!
37. AHC Engineering Program is well structured. Most of the student success relies on the effort that the student puts in.
38. Wish it had had equivalents of ME10 and M17 at UCSB. Should have some CAD and machine shop courses as electives.
39. The Engineering program at Hancock College is a great way to get into engineering and see what it's all about

- Dom, while your program was hard, I think it's was one of the best learning experiences I've had. Cal Poly is terrible about this, but they typically teach hands off with theoretical examples and not much else in the lower level classes, which is boring and you just don't get much out of it early on. The good teachers like you basically go hands on while getting the theoretical stuff embedded in the real life scenarios so you actually can relate it to something. Your teaching style actually would be used in industry and it's helped my career at General Atomics – Aeronautical Systems a lot in the first year and a half. Some Professors just do theoretical stuff that doesn't translate to real life problems, and it's just complete garbage if they can't relate it to something you're doing in a career. My one teaching suggestion for you to add to your classes is use finite element analysis simulations exported as videos to show how forces, stresses, and objects in motion are going to react. It will make some topics very understandable since seeing stress reactions will actually make a large difference when you're trying to visualize something underload.

• As your student's are about to transfer consider slipping lessons at the end of the quarter on how to actually do finite element analysis using simpler programs like SolidWorks. Knowing that vital for structural design classes later on.

• Your materials book just make Poly's book look like absolute garbage because theirs was so theoretical. I actually had about 6 people barrow that book for a quarter at a time, because you could actually understand it. Most of them came to me when they had low scores at the beginning and they ended up with A's or B's after ditching the Poly book and using yours. It's just that helpful. While I'm in San Diego now, I'd be glad to come up and talk to any of your classes.

40. Professors are your friends, don't be intimidated, they are human too :)
41. It was/is my impression that AHC's curriculum continually trended upward while I attended and today must be even better (if possible)
42. Great program, much better than other local Community Colleges.
43. It would be great if we could get Matlab to be an official course that went more in depth.
44. I wish CE 201-2 was offered at AHC. Perhaps more thermodynamics outside physics class, if not thermo 1 just an introduction (more than just a chapter in physics class).
45. Take advantage of all the resources and don't hesitate to ask help
46. MESA and STEM centers were extremely helpful in forming study groups.
47. Jorstad made me love physics and Dal Bello taught me what it means to be an engineer.
48. AHC, is the best in Engineering. I actually learned, I didn't memorize just to earn a grade. Learning does happen in the Engineering classes.
49. Keep up the hard work and progress!
50. I enjoyed my time at Hancock. They do a great job to prepare you to transfer.
51. Need to push working with Excel, Matlab and such as much as possible.
52. Great program for engr. students.
53. Excellent program and instruction. Provides great opportunity for transferring.
54. Dom is the man and a first class professor!
55. The education at AHC is top notch and as a transfer student it is easy to fear that a student is not getting the same caliber of education as a University, but that is absolutely not the case.
56. In the time I was there, it was a great program.
57. Nothing but fond memories.
58. Put a strong focus on manual unit conversion (both English and metric). Felt this skill was extremely lacking when I transferred.
59. This is a great program!! I am truly proud of where I come from and make it known wherever I go. Thank you for every opportunity!
60. PLC courses would be nice.
61. You guys are awesome
62. I think the engineering program at AHC is excellent and I hope it continues to grow. I hope during the growth the quality and cohesive nature of the program is maintained concurrent with expansion to more course offerings.
63. Take as many of your required courses at CC and save your money, this is the wisest thing you can do.
64. I cannot say much about the engineering program because I was transferring the same quarter Dom Dal Bello arrived at AHC. From what I have heard, everything had improved since his arrival.
65. The Engineering program is up to par with the 4 year college that I went through. the one on one interaction with the engineering professor is really helpful. Small classes are a privilege because of the attention of the professor and the ease of building study groups. I felt prepared when taking upper division course at Cal Poly.
66. It would be nice if all engineering courses were offered every semester, but i do understand there is a lack of available classrooms to do that, and staff. Big thanks to Dom. Never knew how great of an engineering teacher i had before i transferred. Really prepared students for the transfer. Also, thanks to Jorstad for making sure his class was the

hardest i have ever taken even after i've transferred. Metaxas for being a great physics teacher.

67. Would not do this another if given the choice
68. Great program, great faculty, and support from organizations like MESA.
69. Dom and Jorstad are the shit! Seriously a lot better than most undergrad and grad professors.
70. I honestly would not be where I am today without the AHC engineering program.
71. The engineering program at Hancock is fantastic. It prepared me well for transferring and positively changed the way I think and approach problems. I would highly recommend attending Hancock to anyone interested in engineering.
72. This program teaches you how to work hard which pays off at the university level.
73. Great program, wish I could have taken more classes at Hancock but the clock was ticking!
74. Very supportive of your dreams and definitely a great option to university (as far as savings in cost of tuition)
75. Great place to start. Things don't change that much as far as what you'll do. You go to lectures, you take labs, you write reports. It's just different material
76. I enjoyed my years at AHC; it allowed me to transfer, get my BSME in two years, and land my dream job right out of school.
77. Jorstad's Physics 163 class is the top 4 hardest class I ever taken in my undergraduate career so far, Heat Transfer being the first...
78. Overall the best thing about AHC classes was the length of time to complete a course really allowed you to get a good understanding of the material. This was important for base classes that you needed a thorough understanding to succeeding in the proceeding classes. They had good labs as well from what I recall.
79. It's an excellent program. I felt that, on average the instructors seemed more enthusiastic about what they do than those at my 4 year
80. Take advantage that the program is there for you
81. It was good but i wish it would have had more classes
82. The AHC Engineering Program is a great program. I felt very prepared before transferring to my 4 year university.
83. The staff really cares and is always willing to help.
84. This program by far helped me adjust rather easily to a four year college. I felt that I was challenged at AHC to perform and we had expectations to do well and that helped keep me motivated.
85. Very good solid program.
86. The program did a tremendous job in preparing my for a 4-year university due in no small part to the amazing faculty teaching the engineering and STEM courses
87. VERY good preparation for 4 year engineering program.
88. The AHC engineering program gave me a fantastic foundation that propelled me through university and prepared me for my profession. It really showed that the faculty cared about teaching, and about the students. A few suggestions for the AHC engineering program after working in industry for 4 years: 1. Consider incorporating intro mechatronics in EE/programming class 2. Introduction to Computer Aided Drafting (CAD) class - SolidWorks - pretty much most of industry uses this now - Highly utilized in design and prototyping 3. Introduction to Mechanical Design coursework - Get some experience going through the thought process of designing a structure/part/process. We do a lot of problem solving, but feel might be nice to give some more context to doing the HW (design torque transfer/motion transfer mechanism with correct mechanical advantage). Highlights: Truss project and setting up ball launcher after calculating theta-i kinematic equation.
89. My assimilation of the lower division course work for mechanical engineering was on average, or a slightly above when compared to my peers at UCSB
90. Professor Dal Bello is really an incredible resource for students. One of the biggest shocks to me was how little the professors cared about students at the University.
91. Overall, the program is very good. Perhaps the exams should be harder to prepare those going to Cal Poly, but I realize that not everyone is going to Cal Poly.
92. Take all math and engineering courses, the instructors really care.
93. It's awesome!!! Also I would recommend more labs with Integrated Circuits/using logic

gates, first semester here we hit the ground running using TTL parts in lab.

94. I was better prepared for upper level courses by the AHC program than some of the students who spent all 4 years at Poly.
95. I found the quality of the education I received at AHC Engineering to be much higher than that of University. There seemed to be much more support as opposed to a "sink or swim" mentality.
96. Take as many of the engineering classes at AHC as possible. It's a good feeling when you get to the 4 year level and have all of your 2 year level classes out of the way. The 4 year level is where you get to treat yourself to really exciting classes. Don't waste your time and money in the 4 year level on classes that you could get at a great price and good quality at AHC.
97. Highly educational & great teachers
98. Great program with an excellent community of students and professors. I am very proud to have been a part of this.
99. Dom was one of the best engineering teachers I've had, Cal Poly included. It's because of him that I could take an equivalent of circuits 2 in private, when the class was cancelled due to low enrollment. :)

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23. Other comments about Allan Hancock College.

In order of response… Nov. 11 through Nov. 30, 2015

77 answered questions, 72 skipped question

1. Physics, engineering, and Philbin were all great.
2. Allan Hancock College has excellent relations with universities and students should utilize services that are offered to them.
3. DOM is the best
4. AHC is the best community college
5. Support other students. Helping them will mean a lot for the future.
6. Not really. I had an overall great experience.
7. Stick with it, the rewards are worth it after graduation
8. Get all your GE's out of the way asap
9. Overall, a good experience while at Hancock
10. None
11. People should not be discouraged about going to AHC. I feel it prepares you at least as good, if not better, than the four year universities.
12. NA
13. Great community college program compared to others in the state
14. After being at SBCC, AHC, and Cal Poly I find that AHC was my favorite school.
15. Allan Hancock College had everything students need to succeed academically.
16. A good college. College needs to do a better job in supporting students with plans to transfer and provide an easier transition while making the student familiar with the real expectations and demands of an university.
17. a great school
18. Great community college, but too much teacher dependency. Let me explain: Let's say with one teacher I can pass or even get a good grade, but with another teacher in exactly the same class I will either not pass or get a low grade. Why is that? First, let me say that I have been a tutor for most of my schooling years, I also worked as a math tutor at AHC and also in the Math Lab. Let me explain as I see it: Teacher need to know their subject, but equally important is knowing how to teach it and make that AND the no. of their students actually understanding or improving in it, the #1 priority. Teachers of the same classes also need a standard system to adhere to when it comes to testing, homework, curriculum, etc... With teachers that can teach, standards for all teachers/classes, and the #1 priority on ALL students getting good grades, AHC would be a lot better and it will be SO many less frustrated students that will be able to concentrate better in all their classes, spend less time and money redoing classes, and more will be able to transfer and/or finish their education. A win-win for all, AHC and its teachers, too. I have gone to school in 2 different countries and have kids who have done the same and have heard from students throughout about the same problems... This a general problem, not just at AHC, but one

school has to lead/set an example - why not AHC? Thank you for letting me put my 2 cents in.

19. Excellent school! Loved the teachers!
20. AHC did not only prepare me with the proper education to move forward but also life skills to help me succeed.
21. It is a great place to grow! Use it!
22. I would like to see more courses available in Engineering. When I was there I believe Professor Dal Bello was the only one teaching Engineering courses. I'm not sure if the program has grown this past 4-5 years.
23. At the time I was there, the counselors lacked the necessary knowledge regarding transfer requirements for engineering students, which is different from most majors. I voiced my dissatisfaction to Dom and I'm sure that he has gotten the counselors straightened out.
24. AHC is a great jumping off point to any university. I feel the teachers are there for the student's success.
25. there engineering program is the best.
26. A great stepping-stone to 4-year universities, at least in the STEM field. Wonderful preparation for further education and even career.
27. Due to the semester system classes get more depth out of a subject than at poly, so poly has to take multiple quarters for some subjects that require it. For two quarter classes, I have time to learn a lot. As far as one quarter classes go, I am better prepared than other students that only had that class for a quarter. I wish the community college (and university, for that matter) was set up to fully meet market demand for classes, larger classrooms to accommodate more students. This should particularly apply to courses on a critical path, where waiting a semester delays graduation a semester.
28. Regardless of how difficult your classes are, be diligent and develop your time management skills. If you create great habits early on they won't fail you later.
29. The curriculum offered is great. The prices are great and you get a great start for future life at a university.
30. For students paying their way through college or in less fortunate financial situations, there is no reason not to utilize AHC for lower division coursework. You get the same quality of course for a fraction of the cost.
31. Great professors that help you succeed and get you ready to transfer to a 4 year university.
32. Overall great school.
33. Awesome school
34. AHC has instructors in the STEM field that really care about their students (which is much rarer at the 4-year universities) and do an excellent job of preparing them for a 4-year university.
35. I wish I was more knowledgeable about the work related to the degree I chose. I think I would have enjoyed a different engineering career than Env'l Eng'r which is almost solely interpreting regulation and not much engineering. More assistance/knowledge from counselors would have been helpful. I have been successful because of my education, but I didn't enjoy the work especially after the fun problem solving done in school.
36. It's great!
37. The help needed has always been available at AHC with the professors or other resources.
38. Guess it's grown some since I left...hope you added parking spaces!

- When all the MESA students transferred to Cal Poly, only Patrick Hutchinson, Ivan, Sal, and I were the people who didn't act like turtles and fully integrated within the first quarter. Actually Patrick and I took the first dynamics over the summer and understood what we needed to do in order to integrate ourselves. Juan realized this about a year in and followed suit, but the rest never really tried. Another issue I found at Poly was that most of the students joined SHPE (it's not a bad thing), they didn't understand who was funding them and I've seen a few that were offered jobs by those sponsors at a 10 to 15% lower rate than they would normally try to do. They need to understand where the money comes from and it's going to affect them later on.

39. Dom is bomb ;)
40. I attended both AHC and SBCC for 7 years before transferring. I thought AHC had a better math, chem, Engineering and physics departments, while SBCC had a better geology department (only because its bigger, Rob is great)
41. there are many other classes that support Engr curriculum well worth to take at AHC that not too many students take advantage BIO 100, welding, computer prog, SolidWorks, MasterCam, AutoCad, lean manufacturing. It

is very cool to have a semester experience on a software thought on a quarter.

42. The people on campus make it a very welcoming environment.
43. It was only after transfer that I realized what a great education AHC offers.
44. I would have love to have began my college career at Hancock first. I started at a four year university then went to Hancock and then went to a 4-year again. I would have loved to have begun at AHC.
45. Good place to start
46. Ask for the secret chimichanga at the cafeteria!
47. Very happy with my decision to attend AHC.
48. AHC was a key part in keeping education costs down. I paid for my education at AHC out of pocket and because of my shorter time spent at the 4-year, I finished my Bachelors degree with minimal debt. It was a good investment in my academic career and also turned out to be an excellent financial investment as well.
49. Take advantage of the small classes and opportunity to work with instructors.
50. Great college, great people, great faculty and staff.
51. Really cool
52. I would like to thank everyone back at Hancock for helping me to travel to where I am. Looking back I have nothing but admiration and respect for the commitment to quality, the enthusiasm, and care with which the faculty taught me and my fellow classmates.
53. Great campus, great staff, great memories and money saved.
54. AHC is a solid stepping stone to your next level of education. Take the each class seriously because you may need that knowledge layer in your career.
55. It has been 10 years since I left AHC and the faculty and courses were at par with 4 year institution that I transferred to. The Science, Math and Engineering departments prepared me to be successful in a four year institution. The motivation to higher learning was well promoted such as post graduate work. If it was not for the information that the MESA program, Engineering and science department offered to me, the motivation in me getting a Masters in engineering would have not been there. Currently I have a job where I can practice my Mechanical Engineering profession and I feel a big contributor to my success was Allan Hancock College.
56. Keep up the good work.
57. Great school, great teachers
58. Good place to start, but easy to get stuck in Santa Maria. Get out asap.
59. Unfortunately upon transferring to CSULB I had to retake several AHC engineering classes including dynamics and deformables [Strength of Materials – Ed.]. I received an A in each which is evidence to the quality of the class taught at AHC. If AHC and CSULB had a smoother transfer process (similar to that of AHC and Cal Poly SLO) then other students may not have to waste a semester taking classes previously taken.
60. The three years I spent at Hancock were some of my best years so far. I miss everything about it and I hope to be able to teach there in the future.
61. Loved my experience... My dream became a reality with Allan Hancock... And the science and engineering dept were always motivational and encouraging me to accomplish my dreams
62. The college is a great place. I spent a lot of time there and majority was positive. Take advantage of the access you have to resources and teachers and learn the stuff well.
63. AHC really needs a 24 hr room, especially for a lot of the STEM majors. It is frustrating to go study at Denys after hours.
64. It was affordable and easier to get financial aid. The campus was easy to get to and park.
65. Thank you
66. Allan Hancock College is a great school. There are a lot of programs and classes at AHC that are not offered at other community colleges.
67. The program did a tremendous job in preparing my for a 4-year university due in no small part to the amazing faculty teaching the engineering and STEM courses
68. AHC provided me a first-class education that propelled me through university, and into my job. The fact that I was able to explore and take classes that I was interested in allowed me to find my real passions, and not be constrained by what major I declared upon entry. I highly recommend to all young friends considering college to consider a junior college to start.
69. The automotive and welding course work I took that was not a part of the engineering program has helped me develop professionally

as well. I have a lot of hands on skills my peers do not..

70. I honestly think Allan Hancock College is a very well run institution with excellent staff. One of the hardest things for me to get used to was the change in involvement of the professors in my curriculum, and in my academic planning. Compared to the university I attended after Hancock, Hancock was well organized with great professors who cared more about the students than professors are the private university I attended.
71. This is a great community college. I appreciate the more nurturing aspect of a community college.
72. Great experience, enjoy it.
73. Loved it, glad I went to AHC before going to a 4-year university
74. The consoling in financial aide and planning out your coursework at AHC was top notch. Notably better than University. The people at AHC actually engage you and make you aware of opportunities that an 18yr old kid won't likely know. I felt like at the university you were largely on your own and had to be aggressive to find needed support (like tutoring, or answers to FAFSA questions).
75. It's a wise decision financially. I haven't regretted it for a second.
76. Fun school with many resources
77. Allan Hancock College has given me some of the best memories of my life and I could not be more thankful.

E4. Articulation Status of Courses

CATALOG DESCRIPTION

This course provides an overview of the engineering profession and educational path in order for students to evaluate engineering as a career choice. The course is also applicable for science, mathematics and architecture majors. The engineering branches are introduced, along with their relationships to science and other fields of study. The education process and strategies for engineering and science students to reach their full academic potential are explored. Course topics include professional duties, responsibilities, employment opportunities, the engineering design process and problem solving. Students will develop a study plan and research technical topics. Guest speakers include working engineers and university representatives.

AHC Special Notes	Articulation Institution	Prefix	Title
	Cal Poly Pomona	- - - - - - - - - - - - - - - - -	No General "Introduction to Engineering"
	Cal Poly San Luis Obispo	MATE 110 And **NEED ARTIC REQUEST?**	Introduction to Materials Engineering Design I (1) And CE 111, Introduction to Civil Engineering (1)
	CSU Bakersfield	**NEED ARTIC REQUEST**	ECE/ENGR 1618, Introduction to Engineering 1 (2)
	CSU Channel Islands	- - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU Chico	**NEED ARTIC REQUEST?**	CIVL 101, Introduction to Civil Engineering (1)
	CSU Dominguez Hills	- - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU East Bay	ENGR 1011	Introduction to Engineering (3)
	CSU Fresno	ME 1	Introduction to Mechanical Engineering (1)
	CSU Fullerton	**NEED ARTIC REQUEST?**	EGGN 100, Introduction to Engineering (**3**)
	CSU Long Beach	ENGR 101	Introduction to Engineering Professions (1)
	CSU Los Angeles	ENGR 1500	Introduction to Engineering and Technology (3)
	CSU Monterey Bay	- - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU Northridge	**NEED ARTIC REQUEST?**	MSE 101, Introduction to Engineering (1) and Lab (1)
	CSU Sacramento	**NEED ARTIC REQUEST**	ENGR 1, Introduction to Engineering (1)
	CSU San Bernardino	- - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU San Marcos	- - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU Stanislaus	- - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	Humboldt State	- - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	San Diego State	**???????????????**	Don't articulate (most recent ASSIST 2009-2010)
	San Francisco State	ENGR 100	Introduction to Engineering (1)
	San Jose State	ENGR 10	Introduction to Engineering (1)
	Sonoma State	EE 110	Introduction to Engineering & Lab Experience (1)
	UC Transferable	Yes	
	UC Berkeley	- - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	UC Davis	**NEED ARTIC REQUEST** **Pending**	ENGIN 1, Introduction to Engineering (1) **Requested 1/24/12** **[ENGIN 1, Introduction to Engineering (1)]**
	UC Irvine	**NEED ARTIC REQUEST**	ENGR 7A, Introduction to Engineering 1 (2)

	UC Los Angeles	- - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	UC Merced	- - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	UC Riverside	**NEED ARTIC REQUEST** ?	ME 18A, Introduction to Engineering Computation (2)
	UC San Diego	- - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	UC Santa Barbara	- - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	UC Santa Cruz	- - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	C-ID		
	CSU GE		
	IGETC		

ENGR 124 Excel for Scientists and Engineers (.5)

5/31/21

CATALOG DESCRIPTION
An introduction to Excel as used in science and engineering. Students use math operations, functions, statistics and graphs to analyze and display data and to differentiate and integrate. Basic application problems are solved.

AHC Special Notes	Articulation Institution	Prefix	Title
	Cal Poly Pomona		
	Cal Poly San Luis Obispo		
	CSU Bakersfield		
	CSU Channel Islands		
	CSU Chico		
	CSU Dominguez Hills		
	CSU East Bay		
	CSU Fresno		
	CSU Fullerton		
	CSU Long Beach		
	CSU Los Angeles		
	CSU Monterey Bay		
	CSU Northridge		
	CSU Sacramento		
	CSU San Bernardino		
	CSU San Marcos		
	CSU Stanislaus		
	Humboldt State		
	San Diego State		
	San Francisco State		
	San Jose State		
	Sonoma State		
	UC Transferable	Yes	
	UC Berkeley		
	UC Davis		
	UC Irvine		
	UC Los Angeles		
	UC Merced		
	UC Riverside		
	UC San Diego		
	UC Santa Barbara		
	UC Santa Cruz		
	C-ID		
	CSU GE		
	IGETC		

ENGR 126 Matlab for Scientists and Engineers (1) **5/31/21**

CATALOG DESCRIPTION

An introduction to Matlab as used in science and engineering. Students create and manipulate matrices, program script, and m-files; generate 2-d and 3-d plots; and solve ODEs. Basic application problems are solved.

AHC Special Notes	Articulation Institution	Prefix	Title
	Cal Poly Pomona		
	Cal Poly San Luis Obispo		
	CSU Bakersfield		
	CSU Channel Islands		
	CSU Chico		
	CSU Dominguez Hills		
	CSU East Bay		
	CSU Fresno		
	CSU Fullerton		
	CSU Long Beach		
	CSU Los Angeles		
	CSU Monterey Bay		
	CSU Northridge		
	CSU Sacramento		
	CSU San Bernardino		
	CSU San Marcos		
	CSU Stanislaus		
	Humboldt State		
	San Diego State		
	San Francisco State	ENGR 290 (for CE/EE)	Modular Elective (1)
	San Jose State		
	Sonoma State		
	UC Transferable	Yes	
	UC Berkeley	ENGIN 7	Introduction to Computer Programing for Scientists and Engineers (4)
	UC Davis		
	UC Irvine		
	UC Los Angeles	C&EE M20	Introduction to Computer Programming with MATLAB (4)
	UC Merced		
	UC Riverside		
	UC San Diego		
	UC Santa Barbara	ENGR 3	Introduction to C Programming (3)
	UC Santa Cruz		
	C-ID		
	CSU GE		
	IGETC		

ENGR 152 Statics (3) **5/31/21**

CATALOG DESCRIPTION

An analysis of forces on engineering structures in equilibrium. Topics include properties of forces, moments, couples, ad resultants. Equilibrium conditions, trusses, frames, centroids, area moments of inertia, beans under point and distributed loads, shear and moment diagrams, cables and friction are covered. Engineering modeling and problem solving are emphasized.

AHC Special Notes	Articulation Institution	Prefix	Title
	Cal Poly Pomona	ETM 2101 **NEED ARTIC REQUEST** **NEED ARTIC REQUEST**	Applied Statics (3) or ARO/CE/ 2041, Engineering Statics (3) or ME 2141, Vector Statics (3)
+ ENGR 156	Cal Poly San Luis Obispo	ME 211 Or ARCE 211 And ARCE 212	Engineering Statics Or Structures I And Structures II
	CSU Bakersfield	ENGR 2110	Analytic Mechanics, Statics (3)
	CSU Channel Islands	**NEED ARTIC REQUEST**	EMEC 230, Statics
	CSU Chico	CIVL 211	Statics (3)
	CSU Dominguez Hills	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU East Bay	**NEED ARTIC REQUEST**	ENGR 220, Statics
	CSU Fresno	CE 20	Engineering Mechanics: Statics (3)
	CSU Fullerton	EGCE 201	Statics (3)
	CSU Long Beach	C E 205 Or CEM/E T 204	Analytical Mechanics I (Statics) (3) Or Applied Mechanics-Statics (3)
	CSU Los Angeles	CE/ME 2010	Statics (3)
	CSU Monterey Bay	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU Northridge	CE 240	Engineering Statics (3)
	CSU Sacramento	CEM/ENGR 30	Analytical Mechanics-Static (3)
	CSU San Bernardino	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU San Marcos	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU Stanislaus	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	Humboldt State	ENGR 210	Solid Mechanics (Statics) (3)
	San Diego State	AE/ME 200	Statics (3)
	San Francisco State	ENGR 102	Statics (3)
	San Jose State	CE 99 Or CE 95	Introductory Statics (3) Theory and Application of Statics (3)
	Sonoma State	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	UC Transferable	Yes	
	UC Berkeley	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)

	UC Davis	ENGIN 35	Statics (4)
	UC Irvine	ENGR 30	Statics (4)
+ ENGR 156 ?	UC Los Angeles	**NEED ARTIC REQUEST** **Or** **NEED ARTIC REQUEST**	C&EE 91, Statics Or MECH&AE 101 - Statics and Strength of Materials
+ ENGR 154	UC Merced	ENGR 57	Statics and Dynamics (4)
	UC Riverside	ME 10	Statics (4)
	UC San Diego	- -	No Equivalent Course (NEC)
	UC Santa Barbara	ME 14	Statics (4)
+ ENGR 156 ?	UC Santa Cruz	**NEED ARTIC REQUEST**	ECE 91, Statics and Mechanics of Materials (4)
	C-ID	**PENDING**	C-ID ENGR 130, Statics
	CSU GE		
	IGETC		

CATALOG DESCRIPTION

Fundamentals of kinematics and kinetics of particles and rigid bodies. Topics include kinematics of particle motion; Newton's second law, work-energy and momentum methods; kinematics of planar motions of rigid bodies; work-energy and momentum principles for rigid body motion; introduction to mechanical vibrations (optional).

AHC Special Notes	Articulation Institution	Prefix	Title
	Cal Poly Pomona	ME 215 OR ETT 211	Vector Dynamics (4) Or Applied Dynamics (3)
	Cal Poly San Luis Obispo	ARCE 225 Or ME 212	Dynamics (3) Or Engineering Dynamics (3)
	CSU Bakersfield	ENGR 2110	Analytical Mechanics, Dynamics (3)
	CSU Channel Islands	**NEED ARTIC REQUEST**	EMEC 231, Dynamics (3)
	CSU Chico	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU Dominguez Hills	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU East Bay	**NEED ARTIC REQUEST**	ENGR 221, Dynamics (3)
	CSU Fresno	- - - - - - - - - - - - - - - - - - - -	Articulation Denied [CE/ME 29, Engineering Mechanics]
	CSU Fullerton	EGCE 302	Dynamics (3)
	CSU Long Beach	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU Los Angeles	**NEED ARTIC REQUEST**	ME 3200, Dynamics 1 (3)
	CSU Monterey Bay	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU Northridge	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU Sacramento	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU San Bernardino	PHYS 235	Vector Dynamics
	CSU San Marcos	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU Stanislaus	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	Humboldt State	**NEED ARTIC REQUEST**	ENGR 211, Solid Mechanics Dynamics (3)
	San Diego State	E M 220	Dynamics (3)
	San Francisco State	ENGR 201	Dynamics (3)
	San Jose State	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	Sonoma State	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	UC Transferable	Yes	
	UC Berkeley	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	UC Davis	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	UC Irvine	ENGR 80	Dynamics (4)
	UC Los Angeles	**NEED ARTIC REQUEST**	MECH & AE 101, Dynamic Particles & Rigid Bodies (4)
+ ENGR 152	UC Merced	ENGR 57	Statics and Dynamics (4)
	UC Riverside	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)

	UC San Diego	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	UC Santa Barbara	ME 16	Engineering Mechanics: Dynamics (4)
	UC Santa Cruz	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	C-ID	C-ID ENGR 230	Dynamics
	CSU GE		
	IGETC		

ENGR 156 Strength of Materials (4) **05/31/21**

CATALOG DESCRIPTION

This course is a study of stresses, strains and deformations associated with axial, torsional and flexural loading of bars, shafts and beams, as well as pressure loading of thin-walled pressure vessels. The course also covers stress and strain transformation, Mohr's Circle, ductile and brittle failure theories, and the buckling of columns. Statically indeterminate systems are also studied.

AHC Special Notes	Articulation Institution	Prefix	Title
	Cal Poly Pomona	ETM 2201	Strength of Materials (3)
+ ENGR 152	Cal Poly San Luis Obispo	ARCE 222 Or ARCE 211 And ARCE 212 Or CE 204 And CE 207	Introduction to Mechanics of Structural Members Or Structures I And Structures II Or Mechanics of Materials I (3) And Mechanics of Materials II (3)
	CSU Bakersfield	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU Channel Islands	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU Chico	**NEED ARTIC REQUEST?**	CIVL 212, Civil Engineering Materials (3)
	CSU Dominguez Hills	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU East Bay	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU Fresno	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU Fullerton	EGCE 301	Mechanics or Materials (3) [Upper Dicision]
	CSU Long Beach	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU Los Angeles	**NEED ARTIC REQUEST**	CE/ME 2050, Strength of Materials I (3)
	CSU Monterey Bay	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU Northridge	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU Sacramento	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU San Bernardino	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU San Marcos	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU Stanislaus	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	Humboldt State	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	San Diego State	- - - - - - - - - - - - - - - - - - -	Doesn't Articulate (09-10 in ASSIST)
	San Francisco State	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	San Jose State	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	Sonoma State	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	UC Transferable	**Yes**	
	UC Berkeley	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	UC Davis	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	UC Irvine	- - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	UC Los Angeles	C&EE 108	Introduction to Mechanics of Deformable Solids

			(4) [Upper-division subject credit only]
	UC Merced	**NEED ARTIC REQUEST?**	ENGR 151, Strength of Materials (4) Upper Division? Yes UPPER DIV
	UC Riverside	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	UC San Diego	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	UC Santa Barbara	ME 15	Strength of Materials (4)
	UC Santa Cruz	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	C-ID	C-ID ENGR 240	Strength of Materials
	CSU GE		
	IGETC		

ENGR 161 Materials Science (3)

05/31/21

CATALOG DESCRIPTION

This course presents the internal structures and resulting behaviors of materials used in engineering applications, including metals, ceramics, polymers, composites, and semiconductors. The emphasis is upon developing the ability both to select appropriate materials to meet engineering design criteria and to understand the effects of heat, stress, imperfections, and chemical environments upon material properties and performance.

AHC Special Notes	Articulation Institution	Prefix	Title
+ENGR 162	Cal Poly Pomona	ETM 2171	Materials Science for Engineering Technology (3)
+ENGR 162	Cal Poly San Luis Obispo	MATE 210 Or MATE 210 And MATE 215	Materials Engineering (3) Or Materials Engineering (3) And Materials Engineering Lab (1)
+ ENGR 162	CSU Bakersfield	ENGR 2140	Materials Science and Engineering (4)
	CSU Channel Islands	EMEC 221	Engineering Materials (3)
+ ENGR 162	CSU Chico	MECH 210	Materials Science and Engineering (3)
	CSU Dominguez Hills	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU East Bay	ENGR 2060	Materials Science (4)
	CSU Fresno	ME 31	Engineering Materials (3)
	CSU Fullerton	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU Long Beach	E T 301	Engineering Materials **[Upper-division subject credit only]**
+ENGR 162	CSU Los Angeles	**NEED ARTIC REQUEST + ENGR 162**	ME 2070, Materials Science and Engineering (4)
	CSU Monterey Bay	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
+ ENGR 162	CSU Northridge	MSE 227 Or MSE 227 And MSE 227L	Engineering Materials (3) Or Engineering Materials (3) And Engineering Materials Lab (1)
	CSU Sacramento	ENGR 45	Engineering Materials (3)
	CSU San Bernardino	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU San Marcos	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU Stanislaus	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	Humboldt State		
	San Diego State	M E 260	Introduction to Engineering Materials (3) [2009-2010]
+ ENGR 162	San Francisco State	ENGR 200	Materials of Engineering (3)
+ ENGR 162	San Jose State	MATE 25	Introduction to Materials (3)
	Sonoma State	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)

	UC Transferable	Yes	
+ ENGR 162	UC Berkeley	ENGIN 45 And ENGIN 45L	Properties of Materials (3) And Properties of Materials Lab (1)
	UC Davis	ENGIN 45	Properties of Materials (4)
+ ENGR 162	UC Irvine	ENGR 54	Principles of Materials Science and Engineering (4)
+ ENGR 162	UC Los Angeles	**NEED ARTIC REQUEST +ENGR 162**	MAT SC 104, Science of Engineering Materials (4)
+ ENGR 162	UC Merced	ENGR 45	Introduction to Materials (4)
	UC Riverside	- -	No Equivalent Course (NEC)
	UC San Diego	MAE 20	Elements of Materials Science (4)
	UC Santa Barbara	- -	No Equivalent Course (NEC)
	UC Santa Cruz	- -	No Equivalent Course (NEC)
+ ENGR 162	C-ID	C-ID ENGR 140B	Material Science and Engineering
	CSU GE		
	IGETC		

ENGR 162 Materials Science Lab (1) **05/31/21**

CATALOG DESCRIPTION

Laboratory to parallel ENGR 161. This course is the experimental exploration of the connections between the structure of materials and materials properties. Laboratories provide opportunities to directly observe the structures and behaviors discussed in the lecture course (ENGR 161), to operate testing equipment, to analyze experimental data, and to prepare reports.

AHC Special Notes	Articulation Institution	Prefix	Title
+ENGR 161	Cal Poly Pomona	ETM 2171	Materials Science for Engineering Technology (3)
+ ENGR 161	Cal Poly San Luis Obispo	MATE 215 Or MATE 210 And MATE 215	Materials Engineering Lab (1) Or Materials Engineering (3) And Materials Engineering Lab (1)
+ ENGR 161	CSU Bakersfield	ENGR 2140	Materials Science and Engineering (4)
	CSU Channel Islands	- -	No Equivalent Course (NEC)
+ ENGR 161	CSU Chico	MECH 210	Materials Science and Engineering (3)
	CSU Dominguez Hills	- -	No Equivalent Course (NEC)
	CSU East Bay	- -	No Equivalent Course (NEC)
	CSU Fresno	ME 32	Engineering Materials Laboratory (1)
	CSU Fullerton	- -	No Equivalent Course (NEC)
	CSU Long Beach	- -	No Equivalent Course (NEC)
	CSU Los Angeles	- -	No Equivalent Course (NEC)
	CSU Monterey Bay	- -	No Equivalent Course (NEC)
+ ENGR 161	CSU Northridge	MSE 227 And MSE 227L	Engineering Materials (3) And Engineering Materials Lab (1)
	CSU Sacramento	- -	No Equivalent Course (NEC)
	CSU San Bernardino	- -	No Equivalent Course (NEC)
	CSU San Marcos	- -	No Equivalent Course (NEC)
	CSU Stanislaus	- -	No Equivalent Course (NEC)
	Humboldt State	- -	No Equivalent Course (NEC)
	San Diego State	- -	No Equivalent Course (NEC)
+ ENGR 161	San Francisco State	ENGR 200	Materials of Engineering (3)
+ ENGR 161	San Jose State	MATE 25	Introductions to Materials (3)
	Sonoma State	- -	No Equivalent Course (NEC)
	UC Transferable	Yes	
+ ENGR 161	UC Berkeley	ENGIN 45 And ENGIN 45L	Properties of Materials (3) And Properties of Materials (1)
+ ENGR 161	UC Davis	ENGIN 45	Properties of Mats (4)
+ ENGR 161	UC Irvine	ENGR 54	Principles of Materials Science and Engineering

			(4)
	UC Los Angeles	- -	No Equivalent Course (NEC)
+ ENGR 161	UC Merced	ENGR 45	Introduction to Materials (4)
	UC Riverside	- -	No Equivalent Course (NEC)
	UC San Diego	- -	No Equivalent Course (NEC)
	UC Santa Barbara	- -	No Equivalent Course (NEC)
	UC Santa Cruz	- -	No Equivalent Course (NEC)
+ ENGR 161	C-ID	C-ID ENGR 140B	Materials Science and Engineering
	CSU GE		
	IGETC		

ENGR 171.doc

ENGR 170 Basic Electric Circuits Analysis (3) **05/31/21**

CATALOG DESCRIPTION

An introduction to the analysis of electrical circuits. Use of analytical techniques based on the application of circuit laws and network theorems. Analysis of DC and AC circuits containing resistors, capacitors, inductors, dependent sources, operational amplifiers, and/or switches. Natural and forced responses of first and second order RLC circuits; the use of phasors; AC power calculations; power transfer; and energy concepts. Most engineering majors are required to complete the associated course (ENGR 171); the laboratory course should be taken concurrently.

AHC Special Notes	Articulation Institution	Prefix	Title
+ ENGR 171	Cal Poly Pomona	ECE 231 And ECE 231L or ETT 201 And ETT 201L	Elements of Electrical Engineering (3) and Elements of Electrical Engineering Lab (1) or Electrical Technology (3) And Electrical Technology Lab (1)
   + ENGR 171 + ENGR 171	Cal Poly San Luis Obispo	EE 201 Or EE 201 And EE 251 Or EE 112 And EE 211 And EE 241	Electric Circuit Theory (3) Or Electric Circuit Theory And Electric Circuits Lab (1) Or Electric Circuit Analysis I (2) And Electric Circuit Analysis II (3) And Electric Circuit Analysis II Lab (1)
+ ENGR 171	CSU Bakersfield	ENGR/ECE/PHYS 2070	Electric Circuits (4)
	CSU Channel Islands	EMEC/PHYS 310	Electronics (4) [Content Subject Credit Only]
	CSU Chico	EECE 211	Linear Circuits I (3)
	CSU Dominguez Hills	**NEED ARTIC REQUEST**	UDE: ENGR 210, Electrical Circuits (3)
+ ENGR 171	CSU East Bay	ENGR 2010	Electric Circuit I (3)
	CSU Fresno	ECE 90	Principles of Electrical Circuits (3)
 + ENGR 171	CSU Fullerton	EGEE 203 And EGEE 203L	Electric Circuits (1) And Electrical Circuits Lab (1)
	CSU Long Beach	EE 211	Electric and Electronic Circuits (3)
	CSU Los Angeles	EE 2040	Circuit Analysis (3)

	CSU Monterey Bay	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
+ ENGR 171	CSU Northridge	ECE 240 or ECE 240 And ECE 240L	Electrical Engineering Fundamentals (3) or Electrical Engineering Fundamentals (3) And Electrical Engineering Fundamentals Lab (1)
	CSU Sacramento	ENGR 17	Introduction Circuit Analysis (3)
	CSU San Bernardino	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU San Marcos	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU Stanislaus	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	Humboldt State	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
+ ENGR 171	San Diego State	EE 204 or EE 210	Principles of Electric Engineering (3) Or [From 2009-2010] Circuit Analysis I (3)
	San Francisco State	ENGR 205	Electric Circuits (3)
+ ENGR 171	San Jose State	EE 98 Or TECH 60	Introduction Circuit Analysis (3) Or Introductions to Electronics (3)
	Sonoma State	ES 220	Electric Circuits (3)
	UC Transferable	Yes	
	UC Berkeley	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
+ ENGR 171	UC Davis	ENGIN 17	Circuits I (4)
+ ENGR 171	UC Irvine	EECS 70A	Network Analysis I (4)
	UC Los Angeles	EL ENGR 100	Electrical and Electronic Circuits (4)
+ ENGR 171	UC Merced	ENGR 65	Circuit Theory (4)
+ ENGR 171	UC Riverside	EE 1A And EE 1LA	Engineering Circuit Analysis I (3) And Engineering Circuit Analysis I Lab (1)
	UC San Diego	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
+ ENGR 171 Or + ENGR 171 Or + ENGR 171	UC Santa Barbara	ME 6 Or ECE 2A Or ECE 10A Or ECE 10A and ECE 10AL	Basic Electrical and Electronic Circuits (4) Or Circuits, Devices, and Systems (5) Or Foundations of Analog and Digital Circuits and Systems (3) Or Foundations of Analog and Digital Circuits and Systems (3) and Foundations of Analog and Digital Circuits and Systems Lab (32
+ ENGR 171	UC Santa Cruz	EE 101 and	Introduction to Electronic Circuits (5) And

		EE 101L	Introduction to Electronic Circuits Lab (1)
	C-ID	C-ID ENGR 260	Circuit Analysis
	CSU GE		
	IGETC		

CATALOG DESCRIPTION

An introduction to the construction and measurement of electrical circuits. Basic use of electrical test and measurement instruments including multimeters, oscilloscopes, power supplies, and function generators. Use of circuit simulation software. Interpretation of measured and simulated data based on principles of circuit analysis for DC, transient, and sinusoidal steady-state (AC) conditions. Elementary circuit design. Practical considerations such as component value tolerance and non-ideal aspects of laboratory instruments. Construction and measurement of basic operational amplifier circuits. The associated lecture course (ENGR 170) should be taken concurrently.

AHC Special Notes	Articulation Institution	Prefix	Title
+ ENGR 170	Cal Poly Pomona	ECE 231 And ECE 231L Or ETT 201 And ETT 201L	Elements of Electrical Engineering (3) And Elements of Electrical Engineering Lab (1) Or Electrical Technology (3) And Electrical Technology Lab (1)
+ ENGR 170 + ENGR 170	Cal Poly San Luis Obispo	EE 201 And EE 251 Or EE 112 And EE 211 And EE 241	Electric Circuit Theory (3) And Electric Circuits Lab (1) Or Electric Circuit Analysis I (2) And Electric Circuit Analysis II (3) And Electric Circuit Analysis II Lab (1)
+ ENGR 170	CSU Bakersfield	ENGR/ECE/PHYS 2070	Electric Circuits (4)
	CSU Channel Islands	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU Chico	EECE 211L	Linear Circuits I Activity (1)
	CSU Dominguez Hills	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
+ ENGR 170	CSU East Bay	ENGR 2010	Electric Circuit I (3)
	CSU Fresno	ECE 90L	Principles of Electrical Circuits Lab (1)
+ ENGR 170	CSU Fullerton	EGEE 203 and EGEE 203L	Electric Circuits (3) and Electric Circuits Lab (1)
	CSU Long Beach	EE 211L	Electric Circuits Lab (1)
	CSU Los Angeles	EE 2049	Electrical Measurements and Circuits Lab (1)
	CSU Monterey Bay	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
+ ENGR 170	CSU Northridge	ECE 240L or ECE 240 And	Electrical Engineering Fundamentals Lab (1) or Electrical Engineering Fundamentals (3) And

		ECE 240L	Electrical Engineering Fundamentals Lab (1)
	CSU Sacramento	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU San Bernardino	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU San Marcos	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	CSU Stanislaus	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
	Humboldt State	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
+ ENGR 170	San Diego State	EE 204 or EE 210	Principles of Electric Engineering (3) Or [From 2009-2010] Circuit Analysis I (3)
	San Francisco State	ENGR 206	Circuits & Instruments Lab (1)
+ ENGR 170	San Jose State	EE 97 or TECH 60	Introduction EE Lab (1) Or Basic Electronics (3)
	Sonoma State	ES 221	Electric Circuits Lab (1)
	UC Transferable	Yes	
	UC Berkeley	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
+ ENGR 170	UC Davis	ENGIN 17	Circuits (4)
+ ENGR 170	UC Irvine	EECS/CSE 70A	Network Analysis I (4)
	UC Los Angeles	EL ENGR 110L	Circuit Measurements Lab (2)
+ ENGR 170	UC Merced	ENGR 65	Circuit Theory (4)
+ ENGR 170	UC Riverside	EE 1A and EE 1LA	Engineering Circuit Analysis I (3) And Engineering Circuit Analysis I Lab (1)
	UC San Diego	- - - - - - - - - - - - - - - - - - - -	No Equivalent Course (NEC)
+ ENGR 170 + ENGR 170 + ENGR 170	UC Santa Barbara	ME 6 Or ECE 2A Or ECE 10A Or ECE 10A and ECE 10AL	Basic Electrical and Electronic Circuits (4) Or Circuits, Devices, and Systems (5) Or Foundations of Analog and Digital Circuits and Systems (3) Foundations of Analog and Digital Circuits and Systems (3) and Foundations of Analog and Digital Circuits and Systems Lab (2)
+ ENGR 170	UC Santa Cruz	EE 101 And EE 101L	Introduction to Electronic Circuits (5) And Introduction to Electronic Circuits Lab (1)
	C-ID	C-ID ENGR 260 L	Circuit Analysis Lab
	CSU GE		
	IGETC		

E5. Course Review Verification Sheet

COURSE REVIEW VERIFICATION

Discipline: ENGINEERING Year: 2020

Program/Discipline ENGINEERING/ENGINEERING

As part of the program evaluation process, the self-study team has reviewed the course outlines supporting the discipline/program curriculum. The review process has resulted in the following recommendations:

1. The following course outlines are satisfactory as written and do not require modification (list all such courses):

   ENGR 100, 124, 126, 152, 154, 156, 161, 162, 170, 171, 172, 173

2. The following courses require minor modification to ensure currency. It is anticipated that such minor modifications will be completed by ________.

3. The following courses require major modification. The self study team anticipates submitting such modifications to the AP&P committee, FALL 20 20 SPRING 20___

   ENGR 170, 171 (PRE-REQUISITE – Math 184 from pre-requisite to co-requisite or prior completion to match C-ID)

GENERAL EDUCATION or MULTICULTURAL/GENDER COURSES

The following courses were also reviewed as meeting an **AHC general education** requirement and were found to satisfactorily meet the established criteria (list courses by prefix & number):

The following courses were also reviewed as meeting an **AHC general education** requirement and will require modification to ensure the content reflects compliance with category definitions (list courses by prefix & number). It is anticipated that such modifications will be completed by:
(date) ____________________

The following courses were also reviewed as meeting the **multicultural/gender graduation** requirement and were found to satisfactorily meet the established criteria (list courses by prefix & number):

The following courses were also reviewed as meeting the **multicultural/general graduation requirement** and will require modification to ensure the content reflects compliance with category definitions (list courses by prefix & number). It is anticipated that such modifications will be completed by:
(date) ____________________

Course Review Team Members:

[signature]	AUG 22 2020		
Signature	Date	Signature	Date
Signature	Date	Signature	Date
		[signature]	8/25/2020
		Signature Academic Dean	Date

COURSE REVIEW VERIFICATION

Discipline:___**ENGINEERING**__________Year:_**2020**_________

As part of the program evaluation process, the self-study team has reviewed the course outlines supporting the discipline/program curriculum. The review process has resulted in the following recommendations:

1. The following course outlines are satisfactory as written and do not require modification (list all such courses):

   ~~ENGR 100, 124, 126, 100, 152, 154, 161, 162~~ Need modification due to COVID.

2. The following courses require minor modification to ensure currency. The self-study team anticipates submitting such modifications to the AP&P, FALL 20____ SPRING 20____:

3. The following courses require major modification. The self-study team anticipates submitting such modifications to the AP&P committee, FALL 20_**20**__ SPRING 20____:

   Due to COVID:
   ADD DL Components: ENGR 100, 124, 126, 100, 152, 154, 161, 162, 170, 171

   Change in pre-req to match C-ID (Math pre-req was accidentally made too high): ENGR 170/171

   All above were submitted by start of instruction, Fall 2020.

4. The following courses require major modification. The self-study team anticipates submitting such modifications to the AP&P committee, ___FALL 20____:

GRADUATION REQUIREMENTS: General Education (GE), Multicultural/Gender Studies (MCGS) and Health & Safety (H&W) Courses.

The following courses were reviewed as meeting an **AHC GE** requirement. The AP&P GE Criteria and Category Definitions (GE Learning Outcomes) forms were submitted to the AP&P for review on: ______________

The following courses were reviewed as meeting the **MCGS** requirement. The AP&P MCGS Criteria and Category Definitions (MCGS Learning Outcomes – To Be Developed) forms were submitted to the AP&P for review on: _______________

The following courses were reviewed as meeting the **H&W** requirement. The AP&P H&W Studies Criteria (To Be Developed) and Category Definitions (H&W Learning Outcomes – To Be Developed) forms were submitted to the AP&P chair for review on: _______________

Course Review Team Members:

Name	Signature	Date
Dominic Dal Bello	Dominic J Dal Bello	11/24/2020
Name	Signature	Date
AP&P Chair	Signature	Date
Academic Dean	Signature	Date

Appendices

A1. Approved Course Outlines

Board Approval: 04/15/1997
PCA Established:
DL Conversion: 10/13/2020
Date Reviewed: Fall 2020
Catalog Year: 2020 - 2021

Allan Hancock College
Course Outline

Discipline Placement: Engineering (Masters Required) and

Department: Mathematical Sciences

Prefix and Number: ENGR 100

Catalog Course Title: Introduction to Engineering

Banner Course Title: Introduction to Engineering

Units and Hours

	Hours per Week	Total Hours per Term (Based on 16-18 Weeks)	Total Units
Lecture	1.000	16.0 - 18.0	
Lab	0.000	0.0 - 0.0	
Outside-of-Class Hours	2.000	32.0 - 36.0	
Total Student Learning Hours	3.0	48.0 - 54.0	1.0
Total Contact Hours	1.0	16.0 - 18.0	

Number of Times Course may be Repeated
None

Grading Method
Letter Grade or Pass/No Pass

Requisites

Advisories
ENGL 514 Writing Skills 4
or eligibility for ENGL 101

Entrance Skills

Upon entering this course, the student should be able to:

ENGL 514 - Writing Skills 4

- write essays, including argumentation, that integrate and synthesize course readings and are clearly focused, fully developed, and logically organized.
- produce in-class or timed essays that illustrate organizing, composing, revising, editing, and time-management skills.
- analyze and paraphrase multiple texts: drawing conclusions, making generalizations, and analyzing arguments.
- write essays to specific audiences using an appropriate voice for those readers.
- formulate an essay with a clear thesis statement or central idea.
- organize essays in which the topic sentences and paragraph details support the thesis.

- construct sentences that demonstrate control of sentence variety and effective word choice, using mostly college-level diction.
- use strategies to accommodate and learn unfamiliar vocabulary.
- proofread and edit essays so that they exhibit few gross errors in English grammar, use, or punctuation.
- identify and evaluate supporting evidence.
- follow prescribed documentation methods and properly use outside sources.

Catalog Description

This course provides an overview of the engineering profession and educational path in order for students to evaluate engineering as a career choice. The course is also applicable for science, mathematics and architecture majors. The engineering branches are introduced, along with their relationships to science and other fields of study. The education process and strategies for engineering and science students to reach their full academic potential are explored. Course topics include professional duties, responsibilities, employment opportunities, the engineering design process and problem solving. Students will develop a study plan and research technical topics. Guest speakers include working engineers and university representatives.

Course Content

Lecture

1. Engineering and Science; Keys to Success in Studying Technical Fields
2. Rewards and Opportunities in Engineering and Science Careers
3. Engineering Disciplines
4. Engineering Design Process; Failures in Engineering
5. Learning Styles, Academic Success Strategies
6. Academic Planning, Personal Assessment
7. Engineering Education System, Professional Engineering Licensure
8. Technical Topics

Course Objectives

At the end of the course, the student will be able to:

1. identify the roles and responsibilities of engineers in society.
2. compare the various engineering branches, and how these branches relate to fields in science.
3. describe the engineering design process; i.e., the steps of problem solving.
4. describe academic requirements, attitudes, and skills that lead to success in the study of science and engineering.
5. assess their own academic strengths and weaknesses.
6. make informed decisions on their education, and create an academic plan.
7. explain in oral and written forms how a piece of technology works.

Methods of Instruction

- **Lecture**

Assignments

- **Other Assignments**
  1. Homework Exercises Example: List ten tasks that an engineer might perform. Rank them in the order that you would most enjoy doing. Explain why you picked your top three. 2. Writing Assignments Example: Pick one of the technical divisions or societies of either the American Society of Mechanical Engineers (ASME), the Institute of Electrical and Electronic Engineers (IEEE), or the American Society of Civil Engineers (ASCE) that you would like to know more about. Research the division or society and write a one-page paper describing it. 3. SEP Assignment Make an appointment at the counseling center to create a SEP. On the internet, look up articulation agreements between Allan Hancock College and your transfer university, and the admissions, degree and G.E. requirements for your major. Check to see if your SEP, articulation agreements, and major requirements are consistent. Create a schedule for your

next four semesters at Allan Hancock College. 4. Research Project Select an engineering, scientific or technological system, object, etc., that you would like to learn more about. The topic should have something to do with your major. A good place to start is at the website: www.howstuffworks.com. (1) Write a two-page paper explaining what your "stuff" is used for and how it works; append the howstuffworks article and at least one additional reference. (2) Prepare to give a brief (5 minute) presentation.

Methods of Evaluation

1. Class attendance and participation 2. Weekly homework and writing assignments (2 hours per week) 3. Student Education Plan (SEP) Project 4. HowStuffWorks.com Project – Technical team-research project; oral and written reports Sample Essay Question: Write a one-page paper about the influence (teachers, parents, television, etc.) that led you to choose engineering as your major.

Texts and Other Instructional Materials

Adopted Textbook

1. Landis, Raymond *Studying Engineering* Edition: 5th 2018

Supplemental Texts

1. Course handouts
2. Internet sources
3. Periodicals and engineering publications
4. Course handouts

Instructional Materials

None

Student Learning Outcomes

1. ENGR100 SLO1 - Explain the basic differences between the various engineering branches, and how these branches relate to fields in science.
2. ENGR100 SLO2 - Describe the engineering design process; i.e., the steps of problem solving.
3. ENGR100 SLO3 - Describe academic requirements, attitudes, and skills that lead to success in the study of science and of engineering.
4. ENGR100 SLO4 - Create a schedule of courses for their next 2-4 academic terms at AHC (and/or transfer institution).
5. ENGR100 SLO5 - Explain in oral and written forms how a piece of technology works.

Distance Learning

Delivery Methods

- Internet

Instructor Initiated Contact Hours Per Week: 1.000

Contact Types

1. Discussion Board
2. Email Communication (group and/or individual communications)
3. Chat room
4. Other (please specify)

   On-campus office hours.

5. Testing

Adjustments to Assignments

Instructors may employ a variety of online tools to make the necessary adjustments in an ERT/DL setting for this course.

- Assignments will be submitted primarily through the district Course Management System (CMS).
- Students can submit multiple files types, type in a textbox to submit their assignments, or submit links to their work in the cloud or other web related service such as Google Docs.
- Students can also submit assignments through district email or the messaging service in the district CMS.
- The district CMS contains many tools instructors can use to facilitate different assignment types.
- Instructors may use the assignments tool and/or discussion tool to facilitate student to student interaction.
- Instructors may use the feedback features of the district CMS to facilitate instructor-initiated contact.
- When appropriate, instructors may use group assignments.

List of possible tools employed to adjust for ERT/DL course may include but not limited to:

- District CMS assignments
- Threaded discussion forums
- District Email
- District CMS messaging service
- Announcements in the district CMS
- Feedback of student work through use of Speed Grader or other tools
- Synchronous audio/videoconferencing (Zoom, Cranium Café)
- Interactive mobile technologies
- Chat, text, Twitter
- Telephone
- Virtual office hours

Adjustments to Evaluation Tools

- ERT/DE courses allow for multiple evaluation tools with online technology.
- This course will be able to use interactive quizzes which allow for automated assessment performance for certain question types, and the use of the mastery gradebook.
- If the assessment requires necessary student authentication, the instructor can employ machine automated proctoring services available through the current district CMS.
- Use of these features (quizzes, discussions, and assignments) provide the necessary tools to evaluate student progress toward the objectives of the course.

Strategies to Make Course Accessible to Disabled Students

The Americans with Disabilities Act of 1990, section 508 of the Rehabilitation Act of 1973, and California Government Code section 11135 all require that accessibility for persons with disabilities be provided. Title 5, section 55200 explicitly makes these requirements applicable to all distance learning offerings. All DL courses and resources must be designed to afford students with disabilities maximum opportunity to access distance learning resources without the need for outside assistance (i.e. sign language interpreters, aides, etc.). Distance learning courses and resources must generally be designed to provide “built-in” accommodation (i.e. closed or open captioning, “alt tags”) which are accessible to “industry standard” assistive computer technology in common use by persons with disabilities.

All courses must meet the **WCAG 2.0 level AA** standards including but not limited to the items listed below:

1. **Images, graphs, charts or animation**. A text equivalent or alt text is provided for every non-text element, including all types of images and animated objects. *This will enable a screen*

reader to read the text equivalent to a blind student.

2. **Multimedia.** Equivalent alternatives for any multimedia presentation are synchronized with the presentation. Videos and live audio must be closed captioned. For archived audio, a transcript maybe sufficient.
3. **Documents and other learning materials**. PDFs, Microsoft Word documents, PowerPoint presentations, Adobe Flash and other content must be as accessible as possible. If it cannot be made accessible, consider using HTML or, if no other option is available, provide an accessible alternative. PDF documents must be properly tagged for accessibility.
4. **Timed quizzes/exams.** Extended time on quizzes and exams is one of the most common accommodations. Instructions for extending time in Canvas.
5. **Outside webpages and links**

- Ensure that all webpages meet 508 standards by testing through Cynthia Says. Follow the Accessibility Guidelines WCAG 2.0 Level AA
- Ensure links make sense out of context. Every link should make sense if the link text is read by itself. *Screen reader users may choose to read only the links on a web page. Certain phrases like "click here" and "more" must be avoided.*

6. **Applications, software, and outside learning systems.** All required outside applications and/or learning systems (e.g MyMathLab, Aleks, etc.) are accessible OR an alternative is provided. Test with WebAIM WAVE toolbar.
7. **Avoid text images.** Images of text are avoided OR an alternative is provided. (Examples of images of text are PDFs made from scanned pages, and word art.)
8. **Color contrast.** Text and background color have sufficient contrast on all documents, PowerPoints, and webpages both inside and outside of the LMS.
9. **Text objects**. If the shape, color, or styling of any text object conveys information, that information is conveyed in plain text as well.
10. **Disability statement.** The course syllabus contains the college's suggested Disability Statement as well as current information on the location and contact information for the Learning Assistance Program (LAP).

Inform Students

Students will be informed of services via Canvas (or other LMS) announcements, email, the syllabus, office hours and the online orientation.

Additional Comments

N/A

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Board Approval: 05/17/2005
PCA Established:
DL Conversion: 10/13/2020
Date Reviewed: Fall 2020
Catalog Year: 2020 - 2021

Allan Hancock College
Course Outline

Discipline Placement: Engineering (Masters Required) and

Department: Mathematical Sciences

Prefix and Number: ENGR 124

Catalog Course Title: Excel for Science and Engineering

Banner Course Title: Excel in Science & Engineering

Units and Hours

	Hours per Week	Total Hours per Term (Based on 16-18 Weeks)	Total Units
Lecture	0.750	12.0 - 13.5	
Lab	0.750	12.0 - 13.5	
Outside-of-Class Hours	1.500	24.0 - 27.0	
Total Student Learning Hours	3.0	48.0 - 54.0	1.0
Total Contact Hours	1.5	24.0 - 27.0	

Number of Times Course may be Repeated
None

Grading Method
Pass/No Pass

Requisites

Prerequisite
MATH 181 Calculus 1

Entrance Skills

Upon entering this course, the student should be able to:

MATH 181 - Calculus 1

- compute the limit (if it exists) of a given function as the independent variable approaches a given value.
- apply the definition of the derivative to find the derivative of a given function.
- apply differentiation techniques to find the derivative of a given function.
- write the equation of a line tangent to a given curve at a given point.
- analyze the continuity of a given function.
- graph functions of one variable by using information obtained from the derivatives as well as algebraic information.
- estimate function values near given data points using the tangent line approximation.
- set up and solve optimization problems.
- evaluate definite and indefinite integrals of a given function.

- use a calculator or computer to generate numerical and graphical data to analyze a calculus problem.

Catalog Description

An introduction to Excel as used in science and engineering. Students use math operations, functions, statistics and graphs to analyze and display data and to differentiate and integrate. Basic application problems are solved.

Course Content

Lecture

1. Introduction to interface, formatting, basic plotting.
2. Math Operators and Functions, Plotting Data.
3. Applications of Excel to Physical, Systems, Engineering Functions.
4. Importing Data from .txt and .csv files.
5. Solving for the Root of an Equation, Roots of Systems of Equations.
6. Graphics and Exporting tables/plots to Word.
7. Intro to Statistics; Use of Excel as Database.
8. Numerical Differentiation and Integration.
9. 1st Order Differential Equations, Miscellaneous.

Course Objectives

At the end of the course, the student will be able to:

1. input a set of data in Excel, and perform mathematical operations on it.
2. plot a set of data in Excel, format and display it in a professional manner with appropriate annotations and graphics, and integrate it into a Word document.
3. sort data, apply conditional formatting and utilize an Excel spreadsheet as a database.
4. create a spreadsheet in Excel to perform numerical differentiation and integration.
5. solve science and engineering problems using Excel's engineering and statistical functions.

Methods of Instruction

- **Lab**
- **Lecture**

Assignments

- **Other Assignments**
  1. Quizzes; 2. Spreadsheet workbooks; 3. Homework and Labwork - Spreadsheet creation. Sample essay question: You have learned that numerical integration does not give exact results. Explain why numerical integration is used, and in what cases it must be used. What factors will decrease the error in the numerical integration compared to the analytical value?

Methods of Evaluation

1. Quizzes; 2. Spreadsheet workbooks; 3. Homework and Labwork - Spreadsheet creation. Sample essay question: You have learned that numerical integration does not give exact results. Explain why numerical integration is used, and in what cases it must be used. What factors will decrease the error in the numerical integration compared to the analytical value?

Texts and Other Instructional Materials

Adopted Textbook

1. Dal Bello, Dominc *Excel Hints (course packet)* Edition: Current 2020

Supplemental Texts

1. Larsen, Ronald. Engineering with Excel (5th Ed.), Pearson, 2017.
2. Computers
3. Course Handouts.
4. Harvey, Greg. Excel 2019 All-in-One For Dummies. For Dummies. 2018.
5. Liengme, Bernard. A Guide to Microsoft Excel 2013 for Scientists and Engineers. 3rd ed. Academic Press, 2015

Instructional Materials
None

Student Learning Outcomes

1. ENGR124 SLO1 - Input a set of data in Excel, and perform mathematical operations on it.
2. ENGR124 SLO2 - Plot a set of data in Excel, format and display it in a professional manner with appropriate annotations and graphics, and integrate it into a Word document.
3. ENGR124 SLO3 - Sort data, apply conditional formatting and utilize an Excel spreadsheet as a database.
4. ENGR124 SLO4 - Solve algebraic equations and systems of linear equations.
5. ENGR124 SLO5 - Create a spreadsheet in Excel to perform numerical differentiation and integration.
6. ENGR124 SLO6 - Solve science and engineering problems using Excel's engineering and statistical functions.

Distance Learning

Delivery Methods

- Internet

Instructor Initiated Contact Hours Per Week: 1.500

Contact Types

1. Discussion Board
2. Email Communication (group and/or individual communications)
3. Chat room
4. Other (please specify)

   On-campus office hours.

5. Testing

Adjustments to Assignments

Instructors may employ a variety of online tools to make the necessary adjustments in an ERT/DL setting for this course.

- Assignments will be submitted primarily through the district Course Management System (CMS).
- Students can submit multiple files types, type in a textbox to submit their assignments, or submit links to their work in the cloud or other web related service such as Google Docs.
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- Chat, text, Twitter
- Telephone
- Virtual office hours

Adjustments to Evaluation Tools

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- If the assessment requires necessary student authentication, the instructor can employ machine automated proctoring services available through the current district CMS.
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3. **Documents and other learning materials**. PDFs, Microsoft Word documents, PowerPoint presentations, Adobe Flash and other content must be as accessible as possible. If it cannot be made accessible, consider using HTML or, if no other option is available, provide an accessible alternative. PDF documents must be properly tagged for accessibility.
4. **Timed quizzes/exams.** Extended time on quizzes and exams is one of the most common accommodations. Instructions for extending time in Canvas.
5. **Outside webpages and links**

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- Ensure links make sense out of context. Every link should make sense if the link text is read by itself. *Screen reader users may choose to read only the links on a web page. Certain phrases like “click here” and “more” must be avoided.*

6. **Applications, software, and outside learning systems.** All required outside applications and/or learning systems (e.g MyMathLab, Aleks, etc.) are accessible OR an alternative is provided. Test with WebAIM WAVE toolbar.
7. **Avoid text images.** Images of text are avoided OR an alternative is provided. (Examples of images of text are PDFs made from scanned pages, and word art.)
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10. **Disability statement.** The course syllabus contains the college's suggested Disability Statement as well as current information on the location and contact information for the Learning Assistance Program (LAP).

Inform Students

Students will be informed of services via Canvas (or other LMS) announcements, email, the syllabus, office hours and the online orientation.

Additional Comments

N/A

Generated on: 5/6/2021 6:58:39 PM

Board Approval: 05/17/2005
PCA Established:
DL Conversion: 10/13/2020
Date Reviewed: Fall 2020
Catalog Year: 2020 - 2021

Allan Hancock College
Course Outline

Discipline Placement: Engineering (Masters Required)

Department: Mathematical Sciences

Prefix and Number: ENGR 126

Catalog Course Title: MATLAB for Science and Engineering

Banner Course Title: Matlab For Science/Engineering

Units and Hours

	Hours per Week	Total Hours per Term (Based on 16-18 Weeks)	Total Units
Lecture	0.750	12.0 - 13.5	
Lab	0.750	12.0 - 13.5	
Outside-of-Class Hours	1.500	24.0 - 27.0	
Total Student Learning Hours	3.0	48.0 - 54.0	1.0
Total Contact Hours	1.5	24.0 - 27.0	

Number of Times Course may be Repeated
None

Grading Method
Pass/No Pass

Requisites

Prerequisite
MATH 181 Calculus 1

Entrance Skills

Upon entering this course, the student should be able to:

MATH 181 - Calculus 1

- compute the limit (if it exists) of a given function as the independent variable approaches a given value.
- apply the definition of the derivative to find the derivative of a given function.
- apply differentiation techniques to find the derivative of a given function.
- write the equation of a line tangent to a given curve at a given point.
- analyze the continuity of a given function.
- graph functions of one variable by using information obtained from the derivatives as well as algebraic information.
- estimate function values near given data points using the tangent line approximation.
- set up and solve optimization problems.
- evaluate definite and indefinite integrals of a given function.

- use a calculator or computer to generate numerical and graphical data to analyze a calculus problem.

Catalog Description

An introduction to Matlab as used in science and engineering. Students create and manipulate matrices, program script, and m-files; generate 2-d and 3-d plots; and solve ODEs. Basic application problems are solved.

Course Content

Lecture

1. MATLAB Operators and Functions, Vector and Matrix Construction
2. Applications of MATLAB m-files to Numerical and Physical Problems
3. Importing Data Sets, Plotting Data, Graphics
4. Curve Fitting, Methods of Interpolation
5. Engineering Functions involving Ordinary Differential Equations

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Course Objectives

At the end of the course, the student will be able to:

1. operate within the Matlab environment to utilize scalar, vector, and matrix functions.
2. program script files in Matlab to solve numerical problems and present results in a professional manner.
3. import data sets into Matlab and create 2 dimensional and 3 dimensional plots of data sets.
4. export data and plots from Matlab to a word processing application.
5. create m-files in Matlab to perform curve fitting and interpolation on data sets.
6. solve ordinary differential equations utilizing Matlab's built-in solvers.
7. use Matlab to solve basic science and engineering problems.

Methods of Instruction

- **Lab**
- **Lecture**

Assignments

- **Other Assignments**
  Homework problem sets/projects in Matlab (example below). Sample homework problems: 1. Given: The hyperbolic cosine function is defined by the equation: coshx=exex-x/2 Req'd: Write a program to calculate the hyperbolic cosine of a user-supplied value of x. Use the program to calculate the hyperbolic cosine of 3.0. Compare the answer that your program produces with the answer produced by the MATLAB intrinsic function cosh(x). Also, use MATLAB to plot the function cosh(x). What is the smallest value that this function can have? At what value of x does it occur? 2. Req'd: Describe the difference between an array, a matrix and a vector.

Methods of Evaluation

1. Quizzes; 2. Homework/projects: creation of m-files and scripts. Sample essay questions: 1. What is the difference between a script file and a function? 2. What are the advantages and disadvantages of the pass-by-value scheme used in Matlab?

Texts and Other Instructional Materials

Adopted Textbook

1. Dal Bello, Dominc *Matlab Workbook for Science and Engineering* Edition: Current 2018

Supplemental Texts

1. Moore, Holly. Matlab for Engineers, 5th ed. Pearson, 2020.
2. Gilat, Amos. MATLAB: An Introduction with Applications, 6th ed., Wiley, 2016.
3. Davis, Timothy. Matlab Primer, 8th ed. CRC Press, 2010.
4. Attaway, Stormy. A Practical Introduction to Programming and Problem Solving, 5th ed. Butterworth-Heinemann, 2018.
5. Course handouts.
6. Computers.
7. Chapman, Stephen. Matlab Programming for Engineers. Cengage, 6th Ed., 2019.
8. Hahn, Brian and Valentine, Daniel. Essential Matlab for Scientists and Engineers. 7th ed., Academic Press, 2019.
9. Pratap, Rudra. Getting Started with Matlab: A Quick Introduction for Scientists and Engineers, 7th ed. Oxford University Press, 2016.

Instructional Materials
None

Student Learning Outcomes

1. ENGR126 SLO1 - Operate within the MATLAB environment to utilize scalar, vector, and matrix functions.
2. ENGR126 SLO2 - Program script files in MATLAB to solve numerical problems and present results in a professional manner.
3. ENGR126 SLO3 - Import data sets into MATLAB and create 2 dimensional and 3 dimensional plots of data sets.
4. ENGR126 SLO4 - Create m-files in MATLAB.
5. ENGR126 SLO5 - Perform curve fitting and interpolation on data sets.
6. ENGR126 SLO6 - Solve ODE problems utilizing MATLAB's built-in solvers.
7. ENGR126 SLO7 - Export data set from MATLAB into Excel, and integrate it into a Word document.

Distance Learning

Delivery Methods

- Internet

Instructor Initiated Contact Hours Per Week: 1.500

Contact Types

1. Discussion Board
2. Email Communication (group and/or individual communications)
3. Chat room
4. Other (please specify)

   On-campus office hours.

5. Testing

Adjustments to Assignments

Instructors may employ a variety of online tools to make the necessary adjustments in an ERT/DL setting for this course.

- Assignments will be submitted primarily through the district Course Management System (CMS).
- Students can submit multiple files types, type in a textbox to submit their assignments, or submit links to their work in the cloud or other web related service such as Google Docs.
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- Interactive mobile technologies
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- Telephone
- Virtual office hours

Adjustments to Evaluation Tools

- ERT/DE courses allow for multiple evaluation tools with online technology.
- This course will be able to use interactive quizzes which allow for automated assessment performance for certain question types, and the use of the mastery gradebook.
- If the assessment requires necessary student authentication, the instructor can employ machine automated proctoring services available through the current district CMS.
- Use of these features (quizzes, discussions, and assignments) provide the necessary tools to evaluate student progress toward the objectives of the course.

Strategies to Make Course Accessible to Disabled Students

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All courses must meet the **WCAG 2.0 level AA** standards including but not limited to the items listed below:

1. **Images, graphs, charts or animation**. A text equivalent or alt text is provided for every non-text element, including all types of images and animated objects. *This will enable a screen reader to read the text equivalent to a blind student.*
2. **Multimedia.** Equivalent alternatives for any multimedia presentation are synchronized with the presentation. Videos and live audio must be closed captioned. For archived audio, a transcript maybe sufficient.
3. **Documents and other learning materials**. PDFs, Microsoft Word documents, PowerPoint presentations, Adobe Flash and other content must be as accessible as possible. If it cannot be made accessible, consider using HTML or, if no other option is available, provide an accessible alternative. PDF documents must be properly tagged for accessibility.
4. **Timed quizzes/exams.** Extended time on quizzes and exams is one of the most common accommodations. Instructions for extending time in Canvas.

5. **Outside webpages and links**

- Ensure that all webpages meet 508 standards by testing through Cynthia Says. Follow the Accessibility Guidelines WCAG 2.0 Level AA
- Ensure links make sense out of context. Every link should make sense if the link text is read by itself. *Screen reader users may choose to read only the links on a web page. Certain phrases like "click here" and "more" must be avoided.*

6. **Applications, software, and outside learning systems.** All required outside applications and/or learning systems (e.g MyMathLab, Aleks, etc.) are accessible OR an alternative is provided. Test with WebAIM WAVE toolbar.
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9. **Text objects**. If the shape, color, or styling of any text object conveys information, that information is conveyed in plain text as well.
10. **Disability statement.** The course syllabus contains the college's suggested Disability Statement as well as current information on the location and contact information for the Learning Assistance Program (LAP).

Inform Students

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Additional Comments

N/A

Generated on: 5/6/2021 6:58:19 PM

Board Approval: 11/13/2018
PCA Established: 05/15/2007
DL Conversion: 10/13/2020
Date Reviewed: Fall 2020
Catalog Year: 2020 - 2021

Allan Hancock College
Course Outline

Discipline Placement: Engineering (Masters Required)

Department: Mathematical Sciences

Prefix and Number: ENGR 152

Catalog Course Title: Statics

Banner Course Title: Statics

Units and Hours

	Hours per Week	Total Hours per Term (Based on 16-18 Weeks)	Total Units
Lecture	4.000	64.0 - 72.0	
Lab	0.000	0.0 - 0.0	
Outside-of-Class Hours	6.000	96.0 - 108.0	
Total Student Learning Hours	10.0	160.0 - 180.0	3.0
Total Contact Hours	4.0	64.0 - 72.0	

Number of Times Course may be Repeated
0

Grading Method
Letter Grade Only

Requisites

Prerequisite
MATH 182 Calculus 2
and

Prerequisite
PHYS 161 Engineering Physics 1
or

Prerequisite
PHYS 141 General Physics 1

Entrance Skills

Upon entering this course, the student should be able to:

MATH 182 - Calculus 2

- evaluate definite and indefinite integrals using a variety of integration formulas and techniques.
- evaluate improper integrals.

- apply integration to areas and volumes, and other applications such as work or length of a curve.
- apply convergence tests to sequences and series.
- represent functions as power series.
- solve differential equations graphically, numerically, and analytically.
- model problems in the natural sciences and the social sciences using differential equations.
- graph, differentiate and integrate functions in polar and parametric form.

PHYS 161 - Engineering Physics 1

- associate terms with corresponding definitions.
- identify the significant physical variables in given situations.
- find values of quantities from their definitions, given a situation.
- find values of quantities by reference to the appropriate conditions and principle(s), given a situation.
- solve complex problems by identifying single principle parts and their solutions, and synthesizing the partial solutions to the whole problem solution.
- solve mechanics problems using laws of motion and conservation.
- generalize the given applications of physical principles to similar but novel situations.
- establish or select the proper conditions and observe sufficient data to permit achievement of a given measurement objective.
- document all relevant observations and properly analyze them to achieve the measurement objective.

PHYS 141 - General Physics 1

- associate terms with corresponding definitions.
- identify the significant physical variables in given situations.
- find values of quantities from their definitions, given a situation.
- find values of quantities by reference to the appropriate conditions and principle(s), given a situation.
- solve complex problems by identifying single principle parts and their solutions, and synthesizing the partial solutions to the whole problem solution.
- solve problems in mechanics, fluids, oscillations, and waves using Newton’s laws of motion, energy conservation, and the principle of interference.
- generalize the given applications of physical principles to similar but novel situations.
- establish or select the proper conditions and observe sufficient data to permit achievement of a given measurement objective.
- document all relevant observations and properly analyze them to achieve such a measurement objective.

Entrance Skills Other (Legacy)

1. manipulate vectors according to defined operations.
2. evaluate definite and indefinite integrals using a variety of integration formulas and techniques
3. evaluate improper integrals.
4. apply integration to areas and volumes, and other applications such as work or length of a curve
5. solve differential equations graphically, numerically, and analytically.
6. model problems in the natural sciences and the social sciences using differential equations.
7. associate terms with corresponding definitions.
8. identify the significant physical variables in given situations.
9. find values of quantities from their definitions, given a situation.
10. find values of quantities by reference to the appropriate conditions and principle(s), given a situation.
11. generalize the given applications of physical principles to similar but novel situations.

Catalog Description

A first course in engineering mechanics: properties of forces, moments, couples and resultants; two- and three-dimensional force systems acting on engineering structures in equilibrium; analysis of trusses, and beams; distributed forces, shear and bending moment diagrams, center of gravity, centroids, friction, and area and mass moments of inertia. Optional additional topics include fluid statics, cables, Mohr's circle and virtual work.

Course Content

Lecture

1. Vector Operations
2. Concurrent two- and three-dimensional force systems
3. Moments and couples
4. Equivalent force systems
5. Equilibrium of rigid bodies (two- and three-dimensional)
6. Center of mass; center of gravity
7. Centroids of areas and volumes
8. Distributed force systems
9. Trusses
10. Frames and machines
11. Beams; shear and bending moment diagrams
12. Principles of friction
13. Friction in machines
14. Area and mass moments of inertia
15. Cables (optional)
16. Mohr's circle (optional)
17. Virtual work (optional)
18. Fluid statics (optional)

Course Objectives

At the end of the course, the student will be able to:

1. determine the centroid of lines, areas and volumes, and area moments of inertia.
2. formulate and solve introductory engineering mechanics problems, and effectively communicate legible problem solutions to be understood by engineers in and out of their specific discipline.
3. determine the forces that act on rigid bodies, including: external forces, weight, normal, distributed loads, friction and reactions at supports.
4. calculate internal forces in members and create shear and bending moment diagrams for beams.
5. perform vector analysis methods addressing forces acting on rigid bodies, trusses, frames, and machines.
6. analyze two- and three-dimensional force systems on rigid bodies in static equilibrium.

Methods of Instruction

- **Lecture**

Assignments

- **Other Assignments**
  1. Readings from appropriate sections in the textbook. 2. Weekly problem sets from textbook. 3. Truss bridge design and build project and report. Sample problem: GIVEN: A truss supports a 4.0 kN sign of uniform density. The sign is supported at Joints A and C. REQ'D: Determine the force in: (a) member IH; (b) member HB; (d) member CD; and (e) member CG. Clearly indicate if the member is physically in "tension" ("T") or in "compression" ("C"). Sample problem: GIVEN: The 3-dimensional object of uniform density is made up of a rectangular prism base with a slot, and a cylinder. The cylinder is aligned with the back of the base. The cylinder and slot are centered in the x-direction, so that X = 4.0. REQ'D: Determine the other coordinates of the center of mass (center of volume), and Y and Z.

Methods of Evaluation

- **Exams/Tests**
- **Quizzes**
- **Projects**
- **Group Projects**
- **Class Participation**
- **Home Work**
- **Other**
  1. Weekly problem set, 6 hours per week. Learning hours: 4 in class; 6 out of class; 10 total. 10/3 = 3.33 units, rounds down to 3.0 units. 2. In-class discussions. 3. Quizzes. 4. Design Project and Report (e.g.,

Truss Bridge). 5. Midterm exams. 6. Final exam. Essay questions are not appropriate for this course. An engineering report is required for the Truss Bridge project.

Texts and Other Instructional Materials

Adopted Textbook

1. Merian, J.L. and Kraige, L.G. *Engineering Mechanics: Statics* Edition: 8th 2015

Supplemental Texts

1. Course website.

Instructional Materials

1. Engineering Paper
2. Ruler
3. Truss Bridge building materials (provided by program)

Student Learning Outcomes

1. ENGR152 SLO1 - Generate appropriate Free Body Diagrams.
2. ENGR152 SLO2 - Formulate and solve problems involving statically applied forces in two and three dimensions.
3. ENGR152 SLO3 - Analyze trusses, frames and simple machines.
4. ENGR152 SLO4 - Calculate internal forces and bending moments in beams.

Distance Learning

Delivery Methods
None

Instructor Initiated Contact Hours Per Week: 4.000

Contact Types

1. Discussion Board
2. Email Communication (group and/or individual communications)
3. Chat room
4. Other (please specify)

   On-campus office hours.

5. Testing

Adjustments to Assignments

Instructors may employ a variety of online tools to make the necessary adjustments in an ERT/DL setting for this course.

- Assignments will be submitted primarily through the district Course Management System (CMS).
- Students can submit multiple files types, type in a textbox to submit their assignments, or submit links to their work in the cloud or other web related service such as Google Docs.
- Students can also submit assignments through district email or the messaging service in the district CMS.
- The district CMS contains many tools instructors can use to facilitate different assignment types.
- Instructors may use the assignments tool and/or discussion tool to facilitate student to student interaction.
- Instructors may use the feedback features of the district CMS to facilitate instructor-initiated contact.
- When appropriate, instructors may use group assignments.

List of possible tools employed to adjust for ERT/DL course may include but not limited to:

- District CMS assignments
- Threaded discussion forums
- District Email
- District CMS messaging service
- Announcements in the district CMS
- Feedback of student work through use of Speed Grader or other tools
- Synchronous audio/videoconferencing (Zoom, Cranium Café)
- Interactive mobile technologies
- Chat, text, Twitter
- Telephone
- Virtual office hours

Adjustments to Evaluation Tools

- ERT/DE courses allow for multiple evaluation tools with online technology.
- This course will be able to use interactive quizzes which allow for automated assessment performance for certain question types, and the use of the mastery gradebook.
- If the assessment requires necessary student authentication, the instructor can employ machine automated proctoring services available through the current district CMS.
- Use of these features (quizzes, discussions, and assignments) provide the necessary tools to evaluate student progress toward the objectives of the course.

Strategies to Make Course Accessible to Disabled Students
None

Inform Students

Students will be informed of services via Canvas (or other LMS) announcements, email, the syllabus, office hours and the online orientation.

Additional Comments

N/A

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Board Approval: 04/19/1988
PCA Established: 04/19/1988
DL Conversion: 10/13/2020
Date Reviewed: Fall 2020
Catalog Year: 2020 - 2021

Allan Hancock College
Course Outline

Discipline Placement: Engineering (Masters Required)

Department: Mathematical Sciences

Prefix and Number: ENGR 154

Catalog Course Title: Dynamics

Banner Course Title: Dynamics

Units and Hours

	Hours per Week	Total Hours per Term (Based on 16-18 Weeks)	Total Units
Lecture	3.000	48.0 - 54.0	
Lab	0.000	0.0 - 0.0	
Outside-of-Class Hours	6.000	96.0 - 108.0	
Total Student Learning Hours	9.0	144.0 - 162.0	3.0
Total Contact Hours	3.0	48.0 - 54.0	

Number of Times Course may be Repeated
None

Grading Method
Letter Grade Only

Requisites

Prerequisite
ENGR 152 Statics
and

Prerequisite
MATH 182 Calculus 2

Entrance Skills

Upon entering this course, the student should be able to:

ENGR 152 - Statics

- determine the centroid of lines, areas and volumes, and area moments of inertia.
- formulate and solve introductory engineering mechanics problems, and effectively communicate legible problem solutions to be understood by engineers in and out of their specific discipline.
- determine the forces that act on rigid bodies, including: external forces, weight, normal, distributed loads, friction and reactions at supports.
- calculate internal forces in members and create shear and bending moment diagrams for beams.

- perform vector analysis methods addressing forces acting on rigid bodies, trusses, frames, and machines.
- analyze two- and three-dimensional force systems on rigid bodies in static equilibrium.

MATH 182 - Calculus 2

- evaluate definite and indefinite integrals using a variety of integration formulas and techniques.
- evaluate improper integrals.
- apply integration to areas and volumes, and other applications such as work or length of a curve.
- apply convergence tests to sequences and series.
- represent functions as power series.
- solve differential equations graphically, numerically, and analytically.
- model problems in the natural sciences and the social sciences using differential equations.
- graph, differentiate and integrate functions in polar and parametric form.

Entrance Skills Other (Legacy)

1. evaluate integrals using analytic techniques, tables, and numerical methods.
2. evaluate improper integrals.
3. apply definite integrals to solving problems in disciplines selected from geometry, physics, economics, and probability.
4. solve differential equations graphically, numerically, and analytically.
5. model problems in the natural sciences and the social sciences using differential equations.
6. formulate and solve problems involving static force systems in two and three dimensions.
7. evaluate the state of equilibrium of a mechanical system.
8. analyze trusses, frames and simple machines.
9. determine the centroid of lines, areas and simple volumes.
10. calculate forces and bending moments in beams.

Catalog Description

Fundamentals of kinematics and kinetics of particles and rigid bodies. Topics include kinematics of particle motion; Newton's second law, work-energy and momentum methods; kinematics of planar motions of rigid bodies; work-energy and momentum principles for rigid body motion; Introduction to mechanical vibrations (optional).

Course Content

Lecture

1. Kinematics of Particles: Rectilinear Motion
2. Kinematics of Particles: Curvilinear Motion
3. Newton’s Second Law of Motion
4. Work and Energy
5. Impulse and Momentum
6. Impact
7. Kinetics of Systems of Particles
8. Kinematics of Rigid Bodies: Translation, Rotation and Plane Motion
9. Kinetics Rigid Bodies: Plane Motion
10. Impulse-Momentum for Rigid Bodies
11. Vibration (optional)

Course Objectives

At the end of the course, the student will be able to:

1. Derive and apply the relationships between position, velocity, and acceleration of a particle in rectilinear and curvilinear motion.
2. Derive relations defining the velocity and acceleration of any particle on a rigid body for translation, rotation and general plane motion.
3. Apply Newton's second law to analyze the motion of both a particle in rectilinear or curvilinear translation acted upon by forces and a rigid body in plane motion acted upon by forces and moments.

4. Apply the method of work and energy to engineering problems modeled as a single particle, a system of particles, or a rigid body in plane motion.
5. Apply the method of impulse and momentum to engineering problems modeled as a single particle, as system of particles, or a rigid body in plane motion.
6. Select the method of analysis that is best suited for the solution of a given problem. (Newton's Law, Work and Energy, Impulse and Momentum, or a combination of these methods.)
7. Describe and analyze the plane motion of a particle relative to a rotating frame. Determine the Coriolis acceleration in plane motion.
8. Apply the principle of impulse and momentum to problems of direct and oblique central impact, as well as eccentric impact.
9. Effectively communicate legible engineering solutions to be understood by engineers both in and out of their specific disciplines.

Methods of Instruction

- **Lecture**

Assignments

- **Other Assignments**
  1. Readings from appropriate sections in the textbook. 2. Weekly problem sets from textbook. Sample Assignment: GIVEN: A turn in the road is a circular arc of radius p = 120 m. An engineer has calculated that the maximum safe speed (not the speed limit) for a typical car with a mass of 1200 kg is vs = 28.0 m/s (~62 mph). This safe speed is calculated assuming that the car is moving with constant speed and without sliding while in the turn. REQ'D: (a) Determine the coefficient of static friction ?s, that was assumed to calculate this safe speed. (b) If the safe speed is exceeded, which way does the car skid? Explain/justify your answer in words. WHY? (c) What is the safe speed if the coefficient of friction is half that found in Part (a)? (e.g., if it is raining). Sample Problem: GIVEN: The Crank-Rod-Piston-Cylinder system shown. The Piston is constrained to move along the Cylinder. Crank AB can freely rotate 360°. Crank AB has length R = 4.00 inches, and Rod BC has length L = 8.00 inches. Crank AB rotates counter-clockwise with a constant rate of ? = 20.0 rad/sec. REQ'D: When ? = 45.0° and ? = 20.705°, determine: (a) the angular velocity ?BC of Rod BC; is it clockwise or counter-clockwise? (b) the angular acceleration ?BC of Rod BC; is it clockwise or counter-clockwise? (c) the magnitude and direction of the acceleration ac of the Piston.

Methods of Evaluation

- **Exams/Tests**
- **Quizzes**
- **Class Work**
- **Home Work**
- **Other**
  1. Weekly problem set, 6 hours per week. 2. In-class experiments and discussion. 3. Quizzes. 4. Midterm exams. 5. Final exam. Essay questions are not appropriate for this course.

Texts and Other Instructional Materials

Adopted Textbook

1. J.L. Meriam and L.G. Kraige *Engineering Mechanics, Vol. II: Dynamics* Edition: 8th 2015

Supplemental Texts

1. As posted on the course website.
2. Engineering Paper
3. Ruler

Instructional Materials

None

Student Learning Outcomes

1. ENGR154 SLO1 - Formulate and solve problems involving the kinematics of particles in 2- and 3-dimensions, including relative and constrained motion problems.
2. ENGR154 SLO2 - Formulate and solve problems involving the kinetics of particles in 2- and 3-dimensions, using Newton’s 2nd Law, energy and impulse-momentum methods.
3. ENGR154 SLO3 - Formulate and solve problems involving the planar kinematics of rigid bodies.
4. ENGR154 SLO4 - Describe analytically the rotational motion of rigid bodies.

Distance Learning

Delivery Methods

- Internet

Instructor Initiated Contact Hours Per Week: 3.000

Contact Types

1. Discussion Board
2. Email Communication (group and/or individual communications)
3. Chat room
4. Other (please specify)

   On-campus office hours.

5. Testing

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Inform Students

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Additional Comments

N/A

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Board Approval: 12/14/2004
PCA Established:
DL Conversion: 10/13/2021
Date Reviewed: Fall 2020
Catalog Year: 2020 - 2021

Allan Hancock College
Course Outline

Discipline Placement: Engineering (Masters Required)

Department: Mathematical Sciences

Prefix and Number: ENGR 156

Catalog Course Title: Strength of Materials

Banner Course Title: Strength of Materials

Units and Hours

	Hours per Week	Total Hours per Term (Based on 16-18 Weeks)	Total Units
Lecture	4.000	64.0 - 72.0	
Lab	0.000	0.0 - 0.0	
Outside-of-Class Hours	8.000	128.0 - 144.0	
Total Student Learning Hours	12.0	192.0 - 216.0	4.0
Total Contact Hours	4.0	64.0 - 72.0	

Number of Times Course may be Repeated
None

Grading Method
Letter Grade Only

Requisites

Prerequisite
ENGR 152 Statics

Entrance Skills

Upon entering this course, the student should be able to:

ENGR 152 - Statics

- determine the centroid of lines, areas and volumes, and area moments of inertia.
- formulate and solve introductory engineering mechanics problems, and effectively communicate legible problem solutions to be understood by engineers in and out of their specific discipline.
- determine the forces that act on rigid bodies, including: external forces, weight, normal, distributed loads, friction and reactions at supports.
- calculate internal forces in members and create shear and bending moment diagrams for beams.
- perform vector analysis methods addressing forces acting on rigid bodies, trusses, frames, and machines.
- analyze two- and three-dimensional force systems on rigid bodies in static equilibrium.

Catalog Description

This course is a study of stresses, strains and deformations associated with axial, torsional and flexural loading of bars, shafts and beams, as well as pressure loading of thin-walled pressure vessels. The course also covers stress and strain transformation, Mohr's Circle, ductile and brittle failure theories, and the buckling of columns. Statically indeterminate systems are also studied.

Course Content

Lecture

- Review of Statics/Equilibrium/Factor of Safety
- Stress and Strain
  a. Normal Stress/Strain Curves, Young's Modulus, Poisson's Ratio, Energy Density
  b. Shear Stress/Strain Curves, Shear Modulus, Shear Energy Density
  c. Plane Stress and Plane Strain
  d. General 3-D Stress-Strain relationships (optional)
- Axial Members
  a. Members with constant internal force/area/material
  b. Members with varying (discontinuous/continuous) internal force/area
  c. Displacement Methods to determine movement of a point
  d. Energy Methods
  e. Statically Indeterminate Systems (optional)
- Pressure Vessels (Thin-walled)
- Torsion Members
  a. Members with constant internal force/area/material
  b. Members with varying (discontinuous/continuous) internal force/area
  c. Displacement Methods to determine movement of a point
  d. Statically Indeterminate Systems (optional)
- Beams
  a. Shear and Moment Diagrams
  b. Bending Stress
  c. Beam Displacement
  d. Shear Stress
  e. Shear Flow
  f. Shear Center (optional)
  g. Statically Indeterminate Systems (optional)
- Combined Loads and Stresses
- Stress Transformation
  a. Transformation Equations
  b. Principal Stresses/Maximum Shear Stress
  c. Mohr's Circle
  d. Strain Transformation (optional)
- Failure Criteria
  a. Brittle Failure (Maximum Normal Stress)
  b. Maximum Shear Stress (Tresca)
  c. Maximum Strain Energy (von Mises)
- Buckling of Columns

Course Objectives

At the end of the course, the student will be able to:

1. Given a loading condition on a structural system. determine the forces (torques and/or moments) applied on each structural member of a system, and the internal forces and couples at internal sections.
2. Given the forces (torques/moments) applied to structural members, identify the applicable theory, and apply the appropriate equations to calculate the internal stresses, strains and/or displacements
3. Perform coordinate transformations of the state of stress and strain at a point, including using Mohr's Circle.
4. Determine if a structural system meets its design specifications, and/or determine how the system will fail, given or having calculated the stresses, strains and displacements.

Methods of Instruction

- **Demonstration**
- **Lecture**

Assignments

- **Other Assignments**
  1. Homework assignments, samples given below. 2. Design Project (Report). Write an engineering report that develops theory to evaluate various shape and materials combinations for a beam of a given length and strength. From the list of shape and material combinations provided, determine which shape/material combination gives the lightest structure (remember, all beams must carry the same load). Include recommendations to further decrease the weight. Sample Assignments: Problem 1 Given: Solid steel shaft ABC is driven by a 240 kW motor at 1800 rpm (revolutions per minute). The gears at B and C drive machines requiring 80 and 160 kW, respectively. The lengths of the two segments of the shaft are LAB = 1.0 m and LBC= 0.5 m. G = 75 GPa. Req'd: Determine the required diameter D of the shaft (constant from A to C) if the allowable shear stress is 70 MPa, and the allowable angle of twist between Sections A and C is 3.0°. Problem 2 Given: Two L = 6-ft long wood "4x4" beams, (actual dimensions b×b = 3.5×3.5 inches), are glued together to form a solid beam. The weight density of wood is 0.02 lb/in3. The beam is simply supported. Req'd: If the glued joint has an allowable shear stress of 200 psi, determine the allowable load, Pallow, which may be applied to the midpoint of the span (take into account the weight of the beams).

Methods of Evaluation

- **Exams/Tests**
- **Quizzes**
- **Projects**
- **Class Work**
- **Home Work**
- **Other**
  1. Weekly problem set, 8 hours per week. 2. In-class experiments and discussion. 4. Quizzes. 5. Midterm exams. 6. Final exam. Sample Essay Problems: 1. Explain the difference between design load, proof load, and ultimate load. 2. Why is a factor of safety applied to structural systems? Explain how a factor of safety is chosen for a given type of application. How do you determine if the system meets the criteria established by the factor of safety?

Texts and Other Instructional Materials

Adopted Textbook

1. Leckie, F.A., and Dal Bello, D.J. *Strength and Stiffness of Engineering Systems* Edition: 1st 2009

Supplemental Texts

1. Course website
2. Gere, James. Mechanics of Materials, 9th ed., 2017.
3. Hibbeler, Russell. Mechanics of Materials, 9th ed., 2013.
4. Nash, William. Schaum's Outline of Strength of Materials, 2013,

Instructional Materials

1. Engineering paper
2. Ruler

Student Learning Outcomes

1. ENGR156 SLO1 - Determine the internal loads (forces and moments) in each structural member of an engineering system, given an external loading condition.

2. ENGR156 SLO2 - Identify the applicable theory, and apply the appropriate equations to calculate the internal stresses, strains and/or displacements in axial members, torsion members, beams, pressure vessels and bolted connections.
3. ENGR156 SLO3 - Determine the stresses, strains and displacements in members subjected to combined loading.
4. ENGR156 SLO4 - Perform coordinate transformations of stresses and strains at a point, including using Mohr's Circle.
5. ENGR156 SLO5 - Determine if a structural system meets its design specifications, and/or determine how the system will fail, given or having calculated the stresses, strains and displacements.
6. ENGR156 SLO6 - Determine the buckling loads of various columns.

Distance Learning

Delivery Methods

- Internet

Instructor Initiated Contact Hours Per Week: 4.000

Contact Types

1. Discussion Board
2. Email Communication (group and/or individual communications)
3. Chat room
4. Other (please specify)

   On-campus office hours.

5. Testing

Adjustments to Assignments

Instructors may employ a variety of online tools to make the necessary adjustments in an ERT/DL setting for this course.

- Assignments will be submitted primarily through the district Course Management System (CMS).
- Students can submit multiple files types, type in a textbox to submit their assignments, or submit links to their work in the cloud or other web related service such as Google Docs.
- Students can also submit assignments through district email or the messaging service in the district CMS.
- The district CMS contains many tools instructors can use to facilitate different assignment types.
- Instructors may use the assignments tool and/or discussion tool to facilitate student to student interaction.
- Instructors may use the feedback features of the district CMS to facilitate instructor-initiated contact.
- When appropriate, instructors may use group assignments.

List of possible tools employed to adjust for ERT/DL course may include but not limited to:

- District CMS assignments
- Threaded discussion forums
- District Email
- District CMS messaging service
- Announcements in the district CMS
- Feedback of student work through use of Speed Grader or other tools

- Synchronous audio/videoconferencing (Zoom, Cranium Café)
- Interactive mobile technologies
- Chat, text, Twitter
- Telephone
- Virtual office hours

Adjustments to Evaluation Tools

- ERT/DE courses allow for multiple evaluation tools with online technology.
- This course will be able to use interactive quizzes which allow for automated assessment performance for certain question types, and the use of the mastery gradebook.
- If the assessment requires necessary student authentication, the instructor can employ machine automated proctoring services available through the current district CMS.
- Use of these features (quizzes, discussions, and assignments) provide the necessary tools to evaluate student progress toward the objectives of the course.

Strategies to Make Course Accessible to Disabled Students

The Americans with Disabilities Act of 1990, section 508 of the Rehabilitation Act of 1973, and California Government Code section 11135 all require that accessibility for persons with disabilities be provided. Title 5, section 55200 explicitly makes these requirements applicable to all distance learning offerings. All DL courses and resources must be designed to afford students with disabilities maximum opportunity to access distance learning resources without the need for outside assistance (i.e. sign language interpreters, aides, etc.). Distance learning courses and resources must generally be designed to provide "built-in" accommodation (i.e. closed or open captioning, "alt tags") which are accessible to "industry standard" assistive computer technology in common use by persons with disabilities.

All courses must meet the **WCAG 2.0 level AA** standards including but not limited to the items listed below:

1. **Images, graphs, charts or animation**. A text equivalent or alt text is provided for every non-text element, including all types of images and animated objects. *This will enable a screen reader to read the text equivalent to a blind student.*
2. **Multimedia.** Equivalent alternatives for any multimedia presentation are synchronized with the presentation. Videos and live audio must be closed captioned. For archived audio, a transcript maybe sufficient.
3. **Documents and other learning materials**. PDFs, Microsoft Word documents, PowerPoint presentations, Adobe Flash and other content must be as accessible as possible. If it cannot be made accessible, consider using HTML or, if no other option is available, provide an accessible alternative. PDF documents must be properly tagged for accessibility.

4. **Timed quizzes/exams.** Extended time on quizzes and exams is one of the most common accommodations. Instructions for extending time in Canvas.
5. **Outside webpages and links**

- Ensure that all webpages meet 508 standards by testing through Cynthia Says. Follow the Accessibility Guidelines WCAG 2.0 Level AA
- Ensure links make sense out of context. Every link should make sense if the link text is read by itself. *Screen reader users may choose to read only the links on a web page. Certain phrases like "click here" and "more" must be avoided.*

6. **Applications, software, and outside learning systems.** All required outside applications and/or learning systems (e.g MyMathLab, Aleks, etc.) are accessible OR an alternative is provided. Test with WebAIM WAVE toolbar.
7. **Avoid text images.** Images of text are avoided OR an alternative is provided. (Examples of images of text are PDFs made from scanned pages, and word art.)
8. **Color contrast.** Text and background color have sufficient contrast on all documents, PowerPoints, and webpages both inside and outside of the LMS.
9. **Text objects**. If the shape, color, or styling of any text object conveys information, that information is conveyed in plain text as well.
10. **Disability statement.** The course syllabus contains the college's suggested Disability Statement as well as current information on the location and contact information for the Learning Assistance Program (LAP).

Inform Students

Students will be informed of services via Canvas (or other LMS) announcements, email, the syllabus, office hours and the online orientation.

Additional Comments

N/A

Generated on: 5/6/2021 7:03:40 PM

Board Approval: 04/15/1996
PCA Established: 01/18/2011
DL Conversion: 10/13/2020
Date Reviewed: Fall 2020
Catalog Year: 2020 - 2021

Allan Hancock College
Course Outline

Discipline Placement: Engineering (Masters Required)

Department: Mathematical Sciences

Prefix and Number: ENGR 161

Catalog Course Title: Materials Science

Banner Course Title: Materials Science

Units and Hours

	Hours per Week	Total Hours per Term (Based on 16-18 Weeks)	Total Units
Lecture	3.000	48.0 - 54.0	
Lab	0.000	0.0 - 0.0	
Outside-of-Class Hours	6.000	96.0 - 108.0	
Total Student Learning Hours	9.0	144.0 - 162.0	3.0
Total Contact Hours	3.0	48.0 - 54.0	

Number of Times Course may be Repeated
None

Grading Method
Letter Grade Only

Requisites

Prerequisite
PHYS 161 Engineering Physics 1
and

Prerequisite
CHEM 150 General Chemistry 1

Advisories
concurrent enrollment in ENGR 162

Entrance Skills

Upon entering this course, the student should be able to:

PHYS 161 - Engineering Physics 1

- associate terms with corresponding definitions.
- identify the significant physical variables in given situations.
- find values of quantities from their definitions, given a situation.

- find values of quantities by reference to the appropriate conditions and principle(s), given a situation.
- solve complex problems by identifying single principle parts and their solutions, and synthesizing the partial solutions to the whole problem solution.
- solve mechanics problems using laws of motion and conservation.
- generalize the given applications of physical principles to similar but novel situations.
- establish or select the proper conditions and observe sufficient data to permit achievement of a given measurement objective.
- document all relevant observations and properly analyze them to achieve the measurement objective.

CHEM 150 - General Chemistry 1

- identify chemical terms and give definitions and/or descriptions of those terms.
- properly use and write chemical formulas and chemical equations.
- convert between various units of measure and understand the concepts of density and temperature.
- classify matter into various subgroups.
- determine the name, family and number of electrons, protons, and neutrons of a particular element from its position on the periodic table.
- relate the structure of an element to the element's properties.
- describe reactions in solution by writing molecular, complete ionic and net ionic equations.
- perform stoichiometric calculations involving mole to mole, mass to mass, mass to volume, and volume to volume relationships.
- calculate the change in enthalpy of a chemical reaction using Hess's Law, enthalpies of formation and bond energies.
- perform calculations involving calorimetry.
- describe the structure of atoms using the quantum mechanical model.
- write electron configurations for atoms and ions and relate to the properties of atoms and the periodic table.
- understand various period trends such as ionization energy and atomic radius.
- describe the different forms of chemical bonding such as covalent and ionic bonding and relate bond type to the properties of compounds.
- draw Lewis structures of molecules.
- identify the molecule geometry of molecules using VSEPR theory including the concepts of hybrid orbitals and molecular orbitals.
- demonstrate skill in calculations involving the various gas laws.
- relate, understand and explain the behavior of gases as described by the kinetic molecular theory.
- describe the properties of liquids and solids based on intermolecular forces.

Catalog Description

This course presents the internal structures and resulting behaviors of materials used in engineering applications, including metals, ceramics, polymers, composites, and semiconductors. The emphasis is upon developing the ability both to select appropriate materials to meet engineering design criteria and to understand the effects of heat, stress, imperfections, and chemical environments upon material properties and performance.

Course Content

Lecture

1. Atomic structure and bonding
2. Crystal structures and crystallography
3. Imperfections in crystals, including polycrystalline, semi-crystalline, and amorphous solids
4. Diffusion
5. Elastic and plastic deformation in metals
6. Strengthening and toughening in metals
7. Mechanical properties and testing
8. Stress-strain analysis
9. Mechanical failure: fracture, fatigue, creep
10. Phase diagrams
11. Phase transformations
12. Iron-Carbon system, heat treatment of steels
13. Metals and Metal Alloys
14. Forming and Fabrication
15. Thermal, electrical and magnetic properties, including semiconductors

16. Chemical properties, including corrosion
17. Structure and properties of polymers
18. Structure and properties of ceramics
19. Structure and properties of composites, including wood and concrete (optional)
20. Selection of materials in engineering design (optional)

Course Objectives

At the end of the course, the student will be able to:

1. Explain the relationship between the internal structure of materials and their macroscopic properties.
2. Identify and explain crystalline structures, directions and planes.
3. Solve diffusion problems.
4. Solve problems concerning the elastic and plastic deformation of axial-loaded members.
5. Explain methods (intentional or unintentional) of altering the structure of materials by mechanical, chemical, or thermal means in order to change material properties.
6. Solve problems concerning basic fracture and fatigue.
7. Solve problems concerning phase diagrams and composition.
8. Describe corrosion and the role it plays in the degradation of materials.
9. Illustrate the various systems for classifying materials, and compare differences in properties among material classes that derive from differences in structure.
10. Gather data from reference sources regarding the properties, processing, and performance characteristics of materials, and use it as a basis to recommend appropriate material(s) to meet engineering design criteria.

Methods of Instruction

- **Lecture**

Assignments

- **Other Assignments**
  1. Readings from appropriate sections of the textbook. 2. Weekly problem sets from textbook. Example Questions: •Plot the stress-strain curve for Aluminum 6061-T6 from the table of experimental data. Determine the modulus of elasticity, the yield strength using the 0.2% offset method, the tensile strength, and the ductility in terms of strain. •List three methods to strengthen a metal. Explain how and why each of these methods increases strength. •A material has an average grain diameter of 400 micormeters Explain the steps required to reduce the grain diameter to 100 micrometers.

Methods of Evaluation

- **Exams/Tests**
- **Quizzes**
- **Class Participation**
- **Class Work**
- **Home Work**
- **Other**
  1. Weekly problem set. 2. In-class discussions. 3. Quizzes. 4. Midterm Exams. 5. Final Exam. EXAMPLE EXAM PROBLEM GIVEN: A titanium plate is t = 5.00 mm thick and W = 400 mm wide, and has a center crack of total length 2a (a << W). The titanium has a Yield Strength of ?y = 900 MPa. The plate is subjected to applied stress ?. REQ'D: (a) If the center crack is 2a = 10.0 mm, and the plate fails by fracture when the applied stress is ? = 450 MPa, determine the Fracture Toughness KIc [MPa ?m] (KIc is also known as the Critical Stress Intensity Factor). (b) Using the value of KIc found in Part (a), determine the maximum value of 2a [mm] so that the plate will fail by yielding (plastic deformation) and not by fast fracture.

Texts and Other Instructional Materials

Adopted Textbook

1. W. Callister *Materials Science and Engineering: An Introduction* Edition: 9th 2014

Supplemental Texts

1. Course website.
2. Handouts distributed in class.
3. Internet sites concerning material science and engineering.
4. Various reference books/texts concerning material science and engineering.

Instructional Materials

1. Engineering Paper.
2. Ruler.

Student Learning Outcomes

1. ENGR161 SLO1 - Distinguish between the various types of atomic bonds.
2. ENGR161 SLO2 - Solve diffusion problems.
3. ENGR161 SLO3 - Solve problems relating to the elastic and plastic deformation of materials.
4. ENGR161 SLO4 - Solve problems relating to basic fracture and fatigue.
5. ENGR161 SLO5 - Associate mechanical properties of metals with their structure, defects and mechanical and thermal processing.
6. ENGR161 SLO6 - Use phase diagrams to determine composition.
7. ENGR161 SLO7 - Describe corrosion and its role it plays in the degradation of materials.
8. ENGR161 SLO8 - Compare mechanical and electrical behaviors of metals, ceramics and semiconductors.

Distance Learning

Delivery Methods

- Internet

Instructor Initiated Contact Hours Per Week: 3.000

Contact Types

1. Discussion Board
2. Email Communication (group and/or individual communications)
3. Chat room
4. Other (please specify)

   On-campus office hours.

5. Testing

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Inform Students

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Additional Comments

N/A

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Board Approval: 01/20/1998
PCA Established: 01/18/2011
DL Conversion:
Date Reviewed: Fall 2020
Catalog Year: 2020 - 2021

Allan Hancock College
Course Outline

Discipline Placement: Engineering (Masters Required)

Department: Mathematical Sciences

Prefix and Number: ENGR 162

Catalog Course Title: Materials Science Lab

Banner Course Title: Materials Science Lab

Units and Hours

	Hours per Week	Total Hours per Term (Based on 16-18 Weeks)	Total Units
Lecture	0.000	0.0 - 0.0	
Lab	3.000	48.0 - 54.0	
Outside-of-Class Hours	-	-	
Total Student Learning Hours	3.0	48.0 - 54.0	1.0
Total Contact Hours	3.0	48.0 - 54.0	

Number of Times Course may be Repeated
None

Grading Method
Letter Grade Only

Requisites

Prerequisite
PHYS 161 Engineering Physics 1
and

Prerequisite
CHEM 150 General Chemistry 1

Corequisite
ENGR 161 Materials Science
or prior completion of ENGR 161

Entrance Skills

Upon entering this course, the student should be able to:

PHYS 161 - Engineering Physics 1

- associate terms with corresponding definitions.
- identify the significant physical variables in given situations.

- find values of quantities from their definitions, given a situation.
- find values of quantities by reference to the appropriate conditions and principle(s), given a situation.
- solve complex problems by identifying single principle parts and their solutions, and synthesizing the partial solutions to the whole problem solution.
- solve mechanics problems using laws of motion and conservation.
- generalize the given applications of physical principles to similar but novel situations.
- establish or select the proper conditions and observe sufficient data to permit achievement of a given measurement objective.
- document all relevant observations and properly analyze them to achieve the measurement objective.

CHEM 150 - General Chemistry 1

- identify chemical terms and give definitions and/or descriptions of those terms.
- properly use and write chemical formulas and chemical equations.
- convert between various units of measure and understand the concepts of density and temperature.
- classify matter into various subgroups.
- determine the name, family and number of electrons, protons, and neutrons of a particular element from its position on the periodic table.
- relate the structure of an element to the element's properties.
- describe reactions in solution by writing molecular, complete ionic and net ionic equations.
- perform stoichiometric calculations involving mole to mole, mass to mass, mass to volume, and volume to volume relationships.
- calculate the change in enthalpy of a chemical reaction using Hess's Law, enthalpies of formation and bond energies.
- perform calculations involving calorimetry.
- describe the structure of atoms using the quantum mechanical model.
- write electron configurations for atoms and ions and relate to the properties of atoms and the periodic table.
- understand various period trends such as ionization energy and atomic radius.
- describe the different forms of chemical bonding such as covalent and ionic bonding and relate bond type to the properties of compounds.
- draw Lewis structures of molecules.
- identify the molecule geometry of molecules using VSEPR theory including the concepts of hybrid orbitals and molecular orbitals.
- demonstrate skill in calculations involving the various gas laws.
- relate, understand and explain the behavior of gases as described by the kinetic molecular theory.
- describe the properties of liquids and solids based on intermolecular forces.

ENGR 161 - Materials Science

- Explain the relationship between the internal structure of materials and their macroscopic properties.
- Identify and explain crystalline structures, directions and planes.
- Solve diffusion problems.
- Solve problems concerning the elastic and plastic deformation of axial-loaded members.
- Explain methods (intentional or unintentional) of altering the structure of materials by mechanical, chemical, or thermal means in order to change material properties.
- Solve problems concerning basic fracture and fatigue.
- Solve problems concerning phase diagrams and composition.
- Describe corrosion and the role it plays in the degradation of materials.
- Illustrate the various systems for classifying materials, and compare differences in properties among material classes that derive from differences in structure.
- Gather data from reference sources regarding the properties, processing, and performance characteristics of materials, and use it as a basis to recommend appropriate material(s) to meet engineering design criteria.

Entrance Skills Other (Legacy)

1. identify chemical terms and give definitions and/or descriptions of those terms.
2. convert between various units of measure and understand the concept of density and temperature.
3. classify matter into various subgroups.
4. describe the structure of atoms using the quantum mechanical model.
5. understand various periodic trends such as ionization energy, and atomic radius.
6. describe the different forms of chemical bonding such as covalent and ionic bonding and relate bond type to the properties of compounds.

7. associate terms with corresponding definitions.
8. identify the significant physical variables in given situations.
9. find values of quantities from their definitions, given a situation.
10. find values of quantities by reference to the appropriate conditions and principle(s), given a situation.

Catalog Description

Laboratory to parallel ENGR 161. This course is the experimental exploration of the connections between the structure of materials and materials properties. Laboratories provide opportunities to directly observe the structures and behaviors discussed in the lecture course (ENGR 161), to operate testing equipment, to analyze experimental data, and to prepare reports.

Course Content

Lecture

Lab

- Introduction/Safety
- Atomic Structure and Bonding
- Crystal Structure
- Mechanical Properties and Testing
- Tensile Testing and Stress-Strain Analysis
- Hardness Testing
- Impact Testing
- Fatigue Testing
- Phase Diagrams
- Heat Treatment
- Microscopy
- Corrosion Effects
- Manufacturing and Fabrication

Course Objectives

At the end of the course, the student will be able to:

1. Prepare and perform tensile tests on metals and polymers.
2. Analyze tensile test stress-strain data.
3. Perform hardness tests on metals.
4. Perform impact tests on metals and relate results to specimen temperature.
5. Gather and interpret temperature (cooling curve) data and relate to the phase diagrams of metal alloys.
6. Interpret microstructure from microscopic images.
7. Observe and describe a galvanic cell and the effect of corrosion on various metallic systems.
8. Perform fatigue analysis.
9. Gather and analyze test data and images using computers.
10. Write laboratory reports that communicate the collection, analysis, and interpretation of experimental data according to professional engineering standards.

Methods of Instruction

- **Lab**

Assignments

- **Other Assignments**
  Each student will complete and turn in pre-lab assignments; e.g., preparatory questions, theoretical analysis. Each student will report on each experiment. During the semester, each student will produce: • one (1) formal report (~16-25 pages, including figures, tables, support data, etc.). • three to four (3-4)

technical memoranda (typed, including figures, tables, support data, etc.) • write-ups/responses to the remaining experiments.

Methods of Evaluation

- **Quizzes**
- **Research Projects**
- **Papers**
- **Projects**
- **Group Projects**
- **Class Participation**
- **Lab Activities**
- **Other**
  1. Weekly pre-labs/quizzes. 2. Lab reports and write-ups (individual and groups). 3. Lab participation.

Texts and Other Instructional Materials

Adopted Textbook

1. D.J. Dal Bello *AHC Materials Science Laboratory manual* 2018
2. D. Bothman and D. Dal Bello *AHC Engineering Program Student Laboratory Handbook, included with the lab manual* 2018
3. W.D. Callister *Materials Science and Engineering: An Introduction* Edition: 7th 2007

Supplemental Texts

1. Handouts to be distributed in class.
2. M.F. Ashby and D.R.H. Jones, Engineering Materials 1 : An Introduction to Properties, Applications and Design, 4th Ed., Butterworth-Heinemann, 2011.

Instructional Materials
None

Student Learning Outcomes

1. ENGR162 SLO1 - Construct models of metallic bonds and calculate their geometric properties.
2. ENGR162 SLO2 - Prepare and perform tensile tests on metals and polymers.
3. ENGR162 SLO3 - Analyze tensile test stress-strain data.
4. ENGR162 SLO4 - Perform Rockwell hardness tests on metals.
5. ENGR162 SLO6 - Interpret microstructure from microscopic images.
6. ENGR162 SLO7 - Gather and interpret temperature (cooling curve) data to generate phase diagrams for metal alloys.
7. ENGR162 SLO11 - Gather and analyze test data and images using computers.

Distance Learning

Delivery Methods

- ERT
- Other

  Emergency Remote Teaching. Some labs may be face-to-face.

Instructor Initiated Contact Hours Per Week: 3.000

Contact Types

1. Discussion Board
2. Email Communication (group and/or individual communications)
3. Chat room

4. In-Person
5. Labs
6. Other (please specify)

   On-campus office hours.

7. Testing

Adjustments to Assignments

Instructors may employ a variety of online tools to make the necessary adjustments in an ERT/DL setting for this course.

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5. **Outside webpages and links**

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- Ensure links make sense out of context. Every link should make sense if the link text is read by itself. *Screen reader users may choose to read only the links on a web page. Certain phrases like “click here” and “more” must be avoided.*

6. **Applications, software, and outside learning systems.** All required outside applications and/or learning systems (e.g MyMathLab, Aleks, etc.) are accessible OR an alternative is provided. Test with WebAIM WAVE toolbar.
7. **Avoid text images.** Images of text are avoided OR an alternative is provided. (Examples of images of text are PDFs made from scanned pages, and word art.)
8. **Color contrast.** Text and background color have sufficient contrast on all documents, PowerPoints, and webpages both inside and outside of the LMS.
9. **Text objects**. If the shape, color, or styling of any text object conveys information, that information is conveyed in plain text as well.
10. **Disability statement.** The course syllabus contains the college’s suggested Disability Statement as well as current information on the location and contact information for the Learning Assistance Program (LAP).

Inform Students

Students will be informed of services via Canvas (or other LMS) announcements, email, the syllabus, office hours and the online orientation.

Additional Comments

N/A

Generated on: 5/6/2021 7:05:11 PM

Board Approval: 03/21/1989
PCA Established: 10/13/2020
DL Conversion: 10/13/2020
Date Reviewed: Fall 2020
Catalog Year: 2021 - 2022

Allan Hancock College
Course Outline

Discipline Placement: Engineering (Masters Required)

Department: Mathematical Sciences

Prefix and Number: ENGR 170

Catalog Course Title: Electric Circuit Analysis

Banner Course Title: Electric Circuit Analysis

Units and Hours

	Hours per Week	Total Hours per Term (Based on 16-18 Weeks)	Total Units
Lecture	3.000	48.0 - 54.0	
Lab	0.000	0.0 - 0.0	
Outside-of-Class Hours	6.000	96.0 - 108.0	
Total Student Learning Hours	9.0	144.0 - 162.0	3.0
Total Contact Hours	3.0	48.0 - 54.0	

Number of Times Course may be Repeated
None

Grading Method
Letter Grade Only

Requisites

Prerequisite
PHYS 163 Engineering Physics 3
and

Advisories
concurrent enrollment in ENGR 171

Corequisite
MATH 184 Linear Algebra/Differential Equations

or previous completion.

Entrance Skills

Upon entering this course, the student should be able to:

MATH 184 - Linear Algebra/Differential Equations

- Create and analyze mathematical models using ordinary differential equations
- Verify solutions of differential equations
- Identify the type of a given differential equation and select and apply the appropriate analytical technique for finding the solution of first order and selected higher order ordinary differential equations
- Apply the existence and uniqueness theorems for ordinary differential equations
- Find power series solutions to ordinary differential equations
- Determine the Laplace Transform and inverse Laplace Transform of functions
- Solve Linear Systems of ordinary differential equations
- Find solutions of systems of equations using various methods appropriate to lower division linear algebra
- Use bases and orthonormal bases to solve problems in linear algebra
- Find the dimension of spaces such as those associated with matrices and linear transformations
- Find eigenvalues and eigenvectors and use them in applications
- Prove basic results in linear algebra using appropriate proof-writing techniques such as linear independence of vectors; properties of subspaces; linearity, injectivity and surjectivity of functions; and properties of eigenvectors and eigenvalues

PHYS 163 - Engineering Physics 3

- associate terms with corresponding definitions.
- identify the significant physical variables in given situations.
- find values of quantities from their definitions, given a situation.
- find values of quantities by reference to the appropriate conditions and principle(s), given a situation.
- solve complex problems by identifying single principle parts and their solutions, and synthesizing the partial solutions to the whole problem solution.
- solve problems in electricity and magnetism using Ohm's law and Maxwell's equations on electro-magnetic theory, including Gauss' law, Ampere's law, Faraday's law.
- generalize the given applications of physical principles to similar but novel situations.
- establish or select the proper conditions and observe sufficient data to permit achievement of a given measurement objective.
- document all relevant observations and properly analyze them to achieve the measurement objective.

Entrance Skills Other (Legacy)

Catalog Description

An introduction to the analysis of electrical circuits. Use of analytical techniques based on the application of circuit laws and network theorems. Analysis of DC and AC circuits containing resistors, capacitors, inductors, dependent sources, operational amplifiers, and/or switches. Natural and forced responses of first and second order RLC circuits; the use of phasors; AC power calculations; power transfer; and energy concepts. Most engineering majors are required to complete the associated course (ENGR 171); the laboratory course should be taken concurrently.

Course Content

Lecture

1. Ohm's Law
2. Electrical Power and Energy
3. Kirchhoff's Laws
4. Equivalent Circuits
5. Voltage and Current Division
6. Dependent Sources
7. Nodal and Mesh Analysis
8. Thevenin and Norton Equivalent Circuits
9. Superposition
10. Operational Amplifiers and Analysis using Ideal Models
11. Voltage gain and current limitations of non-ideal op amp circuits
12. Transient and Complete response of RC, RL, and RLC Circuits
13. Sinusoidal steady-state analysis including phasors, complex impedance, and power factor
14. Frequency response of first and second order AC circuits

15. AC Power including power transfer and power factor correction

Course Objectives

At the end of the course, the student will be able to:

1. Analyze DC circuits to find current, voltage, resistance, power, and/or energy.
2. Draw and label circuit diagrams and show thorough mathematical solutions.
3. Apply different circuit analysis techniques and demonstrate a process for selecting an appropriate technique for a given problem.
4. Solve circuits containing two or more Op Amps.
5. Find the transient response and complete response for RC, RL, and RLC circuits involving DC sources.
6. Solve AC circuits by using Phasors.
7. Calculate average and complex power for AC circuits.

Methods of Instruction

- **Lecture**

Assignments

- **Other Assignments**
  1. Readings from appropriate sections in the textbook. 2. Weekly problem sets from textbook. Sample problem: The circuit shown, with ideal current source, is. The voltage drop measured across R2 is 60 V. Determine: (a) the current through R1, and (b) the total power delivered by source is. (c) If R4 = 20 ? is connected in parallel with R3, what happens to the voltage across R2? Does it increase, decrease or stay the same? Explain/justify your answer with words and/or by calculation. Sample problem: Consider the circuit shown below. The instantaneous voltage is: vs(t) = 20cos10 V. Determine: (a) the phasor current, I, through the 8.0 ? resistor, and (b) the voltage across the 0.01 F capacitor as a function of time, vC(t).

Methods of Evaluation

- **Exams/Tests**
- **Quizzes**
- **Class Participation**
- **Class Work**
- **Home Work**
- **Other**
  1. Weekly problem sets. 2. Quizzes. 3. Midterm exams. 4. Final exam. Solutions to programs are to demonstrate the student's ability to set up, organize and present complete solutions to problems, including labeled circuit diagrams. Essay questions are not appropriate for this course.

Texts and Other Instructional Materials

Adopted Textbook

1. Alexander and Sadiku *Fundamentals of Electric Circuits* Edition: 6th 2017

Supplemental Texts

1. Course website and online resources.
2. Tront, J. PSpice for Basic Circuit Analysis. 2nd ed. McGraw Hill. 2007

Instructional Materials

1. Engineering Paper
2. Ruler

Student Learning Outcomes

1. ENGR170 SLO1 - Analyze resistive circuits utilizing basic techniques of circuit analysis and network theorems.
2. ENGR170 SLO2 - Analyze op-amp circuits.
3. ENGR170 SLO3 - Determine natural and forced responses of first-order RL and RC circuits.
4. ENGR170 SLO4 - Determine natural and forced responses of second-order RLC circuits.
5. ENGR170 SLO5 - Analyze steady-state AC circuits, including power calculations, using complex notation and phasors.

Distance Learning

Delivery Methods

- Internet

Instructor Initiated Contact Hours Per Week: 3.000

Contact Types

1. Discussion Board
2. Email Communication (group and/or individual communications)
3. Chat room
4. Other (please specify)

   On-campus office hours.

5. Testing

Adjustments to Assignments

Instructors may employ a variety of online tools to make the necessary adjustments in an ERT/DL setting for this course.

- Assignments will be submitted primarily through the district Course Management System (CMS).
- Students can submit multiple files types, type in a textbox to submit their assignments, or submit links to their work in the cloud or other web related service such as Google Docs.
- Students can also submit assignments through district email or the messaging service in the district CMS.
- The district CMS contains many tools instructors can use to facilitate different assignment types.
- Instructors may use the assignments tool and/or discussion tool to facilitate student to student interaction.
- Instructors may use the feedback features of the district CMS to facilitate instructor-initiated contact.
- When appropriate, instructors may use group assignments.

List of possible tools employed to adjust for ERT/DL course may include but not limited to:

- District CMS assignments
- Threaded discussion forums
- District Email
- District CMS messaging service
- Announcements in the district CMS
- Feedback of student work through use of Speed Grader or other tools

- Synchronous audio/videoconferencing (Zoom, Cranium Café)
- Interactive mobile technologies
- Chat, text, Twitter
- Telephone
- Virtual office hours

Adjustments to Evaluation Tools

- ERT/DE courses allow for multiple evaluation tools with online technology.
- This course will be able to use interactive quizzes which allow for automated assessment performance for certain question types, and the use of the mastery gradebook.
- If the assessment requires necessary student authentication, the instructor can employ machine automated proctoring services available through the current district CMS.
- Use of these features (quizzes, discussions, and assignments) provide the necessary tools to evaluate student progress toward the objectives of the course.

Strategies to Make Course Accessible to Disabled Students

The Americans with Disabilities Act of 1990, section 508 of the Rehabilitation Act of 1973, and California Government Code section 11135 all require that accessibility for persons with disabilities be provided. Title 5, section 55200 explicitly makes these requirements applicable to all distance learning offerings. All DL courses and resources must be designed to afford students with disabilities maximum opportunity to access distance learning resources without the need for outside assistance (i.e. sign language interpreters, aides, etc.). Distance learning courses and resources must generally be designed to provide "built-in" accommodation (i.e. closed or open captioning, "alt tags") which are accessible to "industry standard" assistive computer technology in common use by persons with disabilities.

All courses must meet the **WCAG 2.0 level AA** standards including but not limited to the items listed below:

1. **Images, graphs, charts or animation**. A text equivalent or alt text is provided for every non-text element, including all types of images and animated objects. *This will enable a screen reader to read the text equivalent to a blind student.*
2. **Multimedia.** Equivalent alternatives for any multimedia presentation are synchronized with the presentation. Videos and live audio must be closed captioned. For archived audio, a transcript maybe sufficient.
3. **Documents and other learning materials**. PDFs, Microsoft Word documents, PowerPoint presentations, Adobe Flash and other content must be as accessible as possible. If it cannot be made accessible, consider using HTML or, if no other option is available, provide an accessible alternative. PDF documents must be properly tagged for accessibility.

4. **Timed quizzes/exams.** Extended time on quizzes and exams is one of the most common accommodations. Instructions for extending time in Canvas.
5. **Outside webpages and links**

- Ensure that all webpages meet 508 standards by testing through Cynthia Says. Follow the Accessibility Guidelines WCAG 2.0 Level AA
- Ensure links make sense out of context. Every link should make sense if the link text is read by itself. *Screen reader users may choose to read only the links on a web page. Certain phrases like "click here" and "more" must be avoided.*

6. **Applications, software, and outside learning systems.** All required outside applications and/or learning systems (e.g MyMathLab, Aleks, etc.) are accessible OR an alternative is provided. Test with WebAIM WAVE toolbar.
7. **Avoid text images.** Images of text are avoided OR an alternative is provided. (Examples of images of text are PDFs made from scanned pages, and word art.)
8. **Color contrast.** Text and background color have sufficient contrast on all documents, PowerPoints, and webpages both inside and outside of the LMS.
9. **Text objects**. If the shape, color, or styling of any text object conveys information, that information is conveyed in plain text as well.
10. **Disability statement.** The course syllabus contains the college's suggested Disability Statement as well as current information on the location and contact information for the Learning Assistance Program (LAP).

Inform Students

Students will be informed of services via Canvas (or other LMS) announcements, email, the syllabus, office hours and the online orientation.

Additional Comments

N/A

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Board Approval: 03/19/1991
PCA Established: 12/11/2018
DL Conversion: 10/13/2020
Date Reviewed: Fall 2020
Catalog Year: 2020 - 2021

Allan Hancock College Course Outline

Discipline Placement: Engineering (Masters Required)

Department: Mathematical Sciences

Prefix and Number: ENGR 171

Catalog Course Title: Electric Circuit Lab

Banner Course Title: Electric Circuit Lab

Units and Hours

	Hours per Week	Total Hours per Term (Based on 16-18 Weeks)	Total Units
Lecture	0.000	0.0 - 0.0	
Lab	3.000	48.0 - 54.0	
Outside-of-Class Hours	-	-	
Total Student Learning Hours	3.0	48.0 - 54.0	1.0
Total Contact Hours	3.0	48.0 - 54.0	

Number of Times Course may be Repeated
None

Grading Method
Letter Grade Only

Requisites

Prerequisite
PHYS 163 Engineering Physics 3
and

Corequisite
MATH 184 Linear Algebra/Differential Equations

Corequisite
ENGR 170 Electric Circuit Analysis
or prior completion of ENGR 170

Entrance Skills

Upon entering this course, the student should be able to:

PHYS 163 - Engineering Physics 3

- associate terms with corresponding definitions.
- identify the significant physical variables in given situations.

- find values of quantities from their definitions, given a situation.
- find values of quantities by reference to the appropriate conditions and principle(s), given a situation.
- solve complex problems by identifying single principle parts and their solutions, and synthesizing the partial solutions to the whole problem solution.
- solve problems in electricity and magnetism using Ohm's law and Maxwell's equations on electro-magnetic theory, including Gauss' law, Ampere's law, Faraday's law.
- generalize the given applications of physical principles to similar but novel situations.
- establish or select the proper conditions and observe sufficient data to permit achievement of a given measurement objective.
- document all relevant observations and properly analyze them to achieve the measurement objective.

MATH 184 - Linear Algebra/Differential Equations

- Create and analyze mathematical models using ordinary differential equations
- Verify solutions of differential equations
- Identify the type of a given differential equation and select and apply the appropriate analytical technique for finding the solution of first order and selected higher order ordinary differential equations
- Apply the existence and uniqueness theorems for ordinary differential equations
- Find power series solutions to ordinary differential equations
- Determine the Laplace Transform and inverse Laplace Transform of functions
- Solve Linear Systems of ordinary differential equations
- Find solutions of systems of equations using various methods appropriate to lower division linear algebra
- Use bases and orthonormal bases to solve problems in linear algebra
- Find the dimension of spaces such as those associated with matrices and linear transformations
- Find eigenvalues and eigenvectors and use them in applications
- Prove basic results in linear algebra using appropriate proof-writing techniques such as linear independence of vectors; properties of subspaces; linearity, injectivity and surjectivity of functions; and properties of eigenvectors and eigenvalues

ENGR 170 - Electric Circuit Analysis

- Analyze DC circuits to find current, voltage, resistance, power, and/or energy.
- Draw and label circuit diagrams and show thorough mathematical solutions.
- Apply different circuit analysis techniques and demonstrate a process for selecting an appropriate technique for a given problem.
- Solve circuits containing two or more Op Amps.
- Find the transient response and complete response for RC, RL, and RLC circuits involving DC sources.
- Solve AC circuits by using Phasors.
- Calculate average and complex power for AC circuits.

Entrance Skills Other (Legacy)

Catalog Description

An introduction to the construction and measurement of electrical circuits. Basic use of electrical test and measurement instruments including multimeters, oscilloscopes, power supplies, and function generators. Use of circuit simulation software. Interpretation of measured and simulated data based on principles of circuit analysis for DC, transient, and sinusoidal steady-state (AC) conditions. Elementary circuit design. Practical considerations such as component value tolerance and non-ideal aspects of laboratory instruments. Construction and measurement of basic operational amplifier circuits. The associated lecture course (ENGR 170) should be taken concurrently.

Course Content

Lecture N/A
Lab

1. Test and Measurement equipment: Use of each item for specific purposes
2. Circuit construction techniques for laboratory use ("breadboarding")
3. Component identification and labeling; nominal and measured values; limitations on voltage, current, power dissipation

4. Verifying lecture concepts: KCL; KVL; Ohm's Law; Voltage and Current Division; Power dissipation; Series and Parallel Circuits; Equivalent circuits; Thevenin equivalent circuit; and Superposition.
5. Operational Amplifiers and the practical voltage and current limits on the output of these devices.
6. Step response of RL, RC, and RLC circuits
7. Frequency response of RL, RC, and RLC circuits (including resonance)
8. Laboratory Safety

Course Objectives

At the end of the course, the student will be able to:

1. Access and use the most basic functions of electrical test and measurement equipment including oscilloscopes, multimeters, function generators and power supplies.
2. Read circuit schematics and construct linear circuits using resistors, capacitors, inductors, and/or op amps.
3. Measure resistance, DC and AC voltages, current, and power, and experimentally verify the results for a variety of electrical circuits.
4. Test circuits, analyze data and compare measured performance to theory and simulation.
5. Use a circuit simulation program (PSPICE, MultiSIM) and other computer applications (MATLAB, MS Excel) to predict or describe circuit behavior.
6. Troubleshoot and repair simple electric circuits.
7. Record and document results of lab work using text and graphs.
8. Work effectively in groups by sharing responsibilities and collaborating on findings.

Methods of Instruction

- **Lab**

Assignments

- **Other Assignments**
  Each laboratory experience requires students to: 1. perform a prelab: preparatory questions, theoretical analysis of the circuit/system of the experiment and/or take a pre-lab quiz as required. 2. perform the experiment, record data, interpret and analyze data. 3. create a written report or write-up – generally typed - that includes a theoretical analysis of the system, recorded data, comparison of theory to measured results. Students create and interpret graphs, explain discrepancies in data, answer posed questions on experiment and new situations. Lab Practicum Each student will individually analyze, construct, power and measure signals of basic circuits. All students must pass the lab practicum to pass the course. Sample PRELAB Questions What value of current is considered lethal? (don't just use the text as a source). What is the color code – the band colors – for a 56 k? resistor with 5% tolerance? List the colors from left to right, assuming the tolerance band is on the right. Standard 10% resistors have the following possible values from 100 through 1000. 100, 120, 150, 180, 220, 270, 330, 390, 470, 560, 680, 820, 1000 Considering the ±10% tolerance, verify (or not) that the entire range of values from 100 to 1000 are covered by the standard resistors. Explain. Sample Post-Lab Response Questions Using Equation 4.6 in this lab manual, derive the value of load resistor RL in terms of Thevenin Voltage and Resistance VTh and RTh that gives the maximum power dissipated by the load (use calculus). SHOW YOUR WORK (use Equation Editor in Microsoft Word). Using the derived equation, and the measured values of VTh and RTh , calculate RL. for maximum power transfer. Does your derived RL for Pmax agree with that found in measurements? (consult the data tables). For the RC Circuit, with the 10.0 Vp-p, 600 Hz sine wave On engineering paper, using a ruler (and protractor), draw the phasors found from measurements (the measured Vp and the measured phase angles ?) on a complex set of axes. All of the phasors should start from the origin of the axes. Assume that the source voltage has zero phase shift (°?=0sVsV). Draw the phasor lengths and angles to scale. Use a reasonable amount of space on the paper. Show, graphically, that Vs = VC + VR , i.e., construct a phasor triangle. Does your phasor diagram agree with the values you predicted? Account for any discrepancies. Lab Practicum Sample Problem 1. For the circuit shown below, using the nominal resistor values provided, calculate v1. 2. For the circuit shown below, using the nominal values provided, calculate i2 or i3 (your choice). 3. Using the Resistor Request form, ask the instructor for the appropriate resistors in terms of their band colors. 4. Construct the circuit (shown in the figure below) and directly measure the values calculated in Steps 1 and 2. Show the instructor your set-up and measurement techniques before you take your circuit apart. The instructor will not necessarily comment on whether your measurements are "right" or "wrong." 5.

Determine the percent difference between the calculated and measured values for the current. Is the difference within expected tolerances? Explain.

Methods of Evaluation

- **Quizzes**
- **Projects**
- **Class Participation**
- **Lab Activities**
- **Writing Requirements**
- **Other**
  1. Weekly pre-labs/quizzes. 2. Lab practicals (exams). 3. Lab reports and write-ups. 4. Lab participation.

Texts and Other Instructional Materials

Adopted Textbook

1. Alexander and Sadiku *Fundamentals of Electric Circuits* Edition: 6th 2017
2. Dal Bello, Dominic J. *AHC Engr. 171 Laboratory Manual* 2019

Supplemental Texts

1. Course website and online resources
2. Tront, J. PSpice for Basic Circuit Analysis. 2nd ed. McGraw Hill. 2007

Instructional Materials

1. Engr. 171 Laboratory Kit, Allan Hancock College Engineering Program.

Student Learning Outcomes

1. ENGR171 SLO1 - Analyze circuits using standard circuit analysis techniques.
2. ENGR171 SLO2 - Build circuits on breadboards with resistive, capacitive and inductive elements.
3. ENGR171 SLO3 - Generate electric signals using DC voltage sources and function generators.
4. ENGR171 SLO4 - Measure voltage, current, and resistance using various meters.
5. ENGR171 SLO5 - Measure voltage, frequency, and phase using an oscilloscope.
6. ENGR171 SLO6 - Record results and analyze and evaluate data.

Distance Learning

Delivery Methods

- Internet

Instructor Initiated Contact Hours Per Week: 3.000

Contact Types

1. Discussion Board
2. Email Communication (group and/or individual communications)
3. Chat room
4. In-Person
5. Labs
6. Other (please specify)

   On-campus office hours.

7. Testing

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- Virtual office hours

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3. **Documents and other learning materials**. PDFs, Microsoft Word documents, PowerPoint presentations, Adobe Flash and other content must be as accessible as possible. If it cannot be made accessible, consider using HTML or, if no other option is available, provide an accessible alternative. PDF documents must be properly tagged for accessibility.
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Additional Comments

N/A

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A2. Degree and Certificate Requirements

Engineering

Award Type: Associate in Arts

The associate degree in engineering provides lower-division coursework that can serve as the basis for a bachelor's degree offered by a four-year college or university. Students who intend to transfer should check the lower-division requirements in the catalog of the college or university to which they intend to transfer, create a Student Educational Plan with an academic counselor, visit www.assist.org, and consult the engineering faculty. The engineering program provides a general background suitable for a variety of engineering fields including mechanical, civil, aerospace, electrical, computer and biomedical engineering.

The graduate of the Associate in Arts in Engineering will:

- Apply fundamental concepts of mathematics (through calculus), science and engineering.
- Identify, formulate, and solve basic engineering problems.
- Conduct experiments and analyze and interpret data.
- Make basic design decisions concerning appropriate-level engineering problems.
- Communicate effectively both orally and in writing, using symbols, graphics and numbers.
- Recognize the need for, and an ability to engage in, lifelong learning.
- Function professionally and ethically as an individual and within diverse teams.
- Use techniques, skills and modern engineering tools necessary in engineering education and practice.

Program Requirements

A major of 32 units is required for the degree. Required core courses (17 units):

Course Number	Course Title	Units
CHEM 150	General Chemistry 1	5.0
MATH 182	Calculus 2	4.0
PHYS 161	Engineering Physics 1	4.0
PHYS 162	Engineering Physics 2	4.0
	or	
PHYS 163	Engineering Physics 3	4.0

Category A - Engineering: Select a minimum of 6 units from Category A and 9 units from selected from Category A and/or Category B.

Course Number	Course Title	Units
ENGR 152	Statics	3.0
ENGR 154	Dynamics	3.0
ENGR 156	Strength of Materials	4.0
ENGR 161	Materials Science	3.0
	and	
ENGR 162	Materials Science Lab	1.0
ENGR 170	Electric Circuit Analysis	3.0
	and	
ENGR 171	Electric Circuit Lab	1.0

Category B - Engineering Support

Course Number	Course Title	Units
CHEM 151	General Chemistry 2	5.0
CS 111	Fundamentals of Programming 1	4.0
ET 140	Engineering Drawing	3.0
ET 145	Advanced Engineering Drawing	3.0
MATH 183	Multivariable Calculus	4.0

MATH 184	Linear Algebra/Differential Equations	5.0
PHYS 162	Engineering Physics 2	4.0
	or	
PHYS 163	Engineering Physics 3	4.0

Recommended electives:

Course Number	Course Title	Units
ENGR 100	Introduction to Engineering	1.0
ENGR 124	Excel for Science and Engineering	1.0
ENGR 126	MATLAB for Science and Engineering	1.0

Validation

V1. Validation Team Members

PROGRAM REVIEW -- VALIDATION TEAM MEMBERS

TO: Academic Dean
Date: 8/20/2021
From: Dominic J. Dal Bello

We recommend the following persons for consideration for the validation team:

DEPARTMENT Mathematical Sciences PROGRAM Engineering

Board Policy requires that the validation team be comprised of the dean of the area, one faculty member from a related discipline/program, and two faculty members from unrelated disciplines.

(Name)	(Discipline/Program)
Robert Jorstad	Physics (Related Discipline/Program)
Christine Reed	Counseling/MESA (Unrelated Discipline/Program)
Brian Stokes	Anthropology (Unrelated Discipline/Program)

At the option of the self-study team, the validation team may also include one or more of the following: a. someone from a four-year institution in the same discipline; someone from another community college in the same discipline; a high school instructor in the same discipline; a member of an advisory committee for the program. Please complete the following as relevant to your program review.

Brian Self (Name) Professor, Mechanical Engineering (Title)

Affiliation: Cal Poly San Luis Obispo Telephone Contact Number: 805-756-7993

Address San Luis Obispo, CA 93407-0001 (Mailing) City/State/Zip bself@calpoly.edu email address

APPROVED: [signature] Academic Dean 8/24/2021 Date

VALIDATION TEAM DUTIES

A program review involves the visitation, observation and analysis of a program/discipline by a team with the purpose of providing suggestions for improvement.

Duties of a Team Member

Previsit Responsibilities

l. Study the self-study report prepared by the faculty.

Visit Responsibilities

l. Meet with program/discipline faculty.

2. Examine teaching materials, supplies and equipment presently being used in the program.

Postvisit Responsibilities

1. Develop an executive summary of team findings and recommendations.

The Role of the Validation Team

The validation team has been selected to include professionals who can assist the program by reviewing the self-study and plan of action, then making comments and suggestions that will lead to program improvement. In addition to reviewing the materials included in the written packet, team members are asked to visit the facility which houses the program, talk with instructors and students in the program, and request any further information or materials which would be helpful in preparing the executive summary.

V2. Executive Summary

EXECUTIVE SUMMARY (Validation Team Report)

The Validation Team for the 2021 Engineering six-year program review—consisting of Physics full-time faculty member Robert Jorstad, MESA Academic Success Center Director Christine Reed, Anthropology full-time faculty member Brian Stokes and Professor of Mechanical Engineering from Cal Poly-SLO Brian Self—met with the author, engineering full-time faculty member Dominic Dal Bello to review and discuss the comprehensive program review approximately for 75 minutes on Tuesday September 14, 2021. It was clear that the members of the team had reviewed the document carefully and came prepared to provide feedback and suggestions to the document's author.

1. MAJOR FINDINGS

Strengths of the program/discipline:

The team members were impressed with the attention to detail, consideration, and thought that was evident throughout the document. The team was able to understand the program well from the report and made a few broad suggestions about how to enrich the data for outside readers' understanding.

As the team discussed the document, they commented on the strong tradition of the Engineering program, particularly in the context of student preparation for transfer to four-year institutions and skills development that will be useful in post-baccalaureate employment as well as the presence of students in the program who represent a broad racial/ethnic diversity. The team attributed this high level of excellence to a number of strengths in the program in three main areas: faculty, curriculum, and facilities.

The team noted that the program is led by a dedicated and engaged full time faculty member who is active at the statewide level, keeps current on all trends in discipline, and maintains a watchful eye on any educational changes that might be indicated via developments in the field or updates at transfer institutions. Other noteworthy faculty activities discussed by the team included an active program of grant-seeking and awarding, development of a robust scholarship program, and high levels of successful transfer to 4-year institutions. Our team member from Cal Poly noted a strong transfer rate history to that institution. Students are very aware of this strong history which has resulted in overall growth in program FTES since 2015.

The second main topic the team discussed was regarding the Engineering program's curriculum. In general, they noted that the curriculum is comprehensive and based this opinion on the transfer rate information, particularly to our local transfer institution, Cal Poly.

Various team members emphasized the Allan Hancock College program is offering courses not offered at other community colleges such as Dynamics, Strength of Materials, and a MATLAB course.

There is also a history of strong curriculum articulation with four-year transfer institutions, particularly with Cal Poly. Of particular note is survey information indicating a high student satisfaction with curriculum, resulting in strong retention and a feeling of preparation for transfer institutions.

The third area of discussion of program strength focused on facilities. The program utilizes dedicated space in the M100/200 building as well as the Industrial Technology's Electronics Lab in the M400 building. These state-of-the-art facilities and equipment match the curriculum goals, through outstanding hands-on lab experience with technology that students will see when they transfer to four-year institutions and later in their careers. Although it was not a part of the program review, the new MESA/STEM Academic Success Center was discussed along with all of the important support from that program for students in the Engineering and other related programs.

Concerns regarding the program/discipline:

During the lengthy discussion on program strengths, areas of concern from the document were noted. There was concern from the team that the current teaching load of the full-time faculty member, when considered in context with the rest of their teaching, program, departmental, grants/research, and college duties, may be overwhelming.

A second concern mentioned by the team was the difficulty in locating data on transfer rate to four-year transfer institutions, specifically a metric to show the percentage of matriculating Engineering students who transfer, and any barriers to that metric. As the team discussed possibilities to ameliorate this deficiency, it was explained that the Guided Pathways success team for science, technology, engineering, and mathematics may be able to address this over time.

The next concerns were very specific and more briefly discussed. In the report, there are several minor curriculum modifications that need to be made in order to meet the California Certificate for Transfer in Engineering requirements. Currently, there is no makerspace on campus that is easily accessible for students in the program; any such activities must occur in the program space of other disciplines (e.g. welding, industrial technologies) and is often very difficult to schedule. Finally, although the program participants are representative of the cultural, racial, and ethnic diversity on campus, the gender representation is skewed heavily to those students who identify as male, for example, the Fall 2021 Statics class' enrollment is 25 students, only one of whom identifies as female.

2. RECOMMENDATIONS

The team is making a number of recommendations that are based on their interpretation of the information presented in the program review and are listed here for consideration.

1. Remove barriers to students who are focused on engineering, specifically the courses that precede core engineering degree requirements, and work for earlier student inclusion in the MESA/STEM Academic Success Center activities for students expressing interest in the engineering program.
2. Locate or replace the program's impact tester which has been placed in storage due to the M100/200 building structure being inadequate for the device. Dedicate an appropriate space for this device which can also be used as a makerspace.
3. Champion women in Engineering via incorporation and highlighting work of female engineers throughout the curriculum, additional outreach focused on recruitment of future female engineers into the program, and other appropriate community and educational partnerships with that same focus.
4. Update curriculum as indicated in the program review in order to meet the requirements of the Certificate for Transfer.
5. Hire a new full-time faculty member with the ability to teach engineering, perhaps in combination with Physics, Mathematics, or other discipline as well as continue to recruit highly-qualified part-time faculty members in the field of Engineering.
6. Dedicate an 11-month Administrative Assistant II for the Mathematical Sciences Department, perhaps to also cover needs in the Life and Physical Sciences Department over the summer.
7. Create a service/maintenance budget structured so year-end balances can be rolled over for additional equipment and supplies purchases or a major set of repairs over multiple years.
8. Create and hire an Engineering Lab technician/student data management classified position.
9. Create data gathering process for student information related to needs described in both the program review and this validation report.

Summary prepared by:
Sean J. Abel,
Dean, Academic Affairs

VALIDATION TEAM SIGNATURE PAGE

Brian P. Self

ROBERT J JORSTAD (Oct 3, 2021 13:25 PDT)

CL Reed (Oct 3, 2021 15:14 PDT)

Brian Stokes

Brian Stokes (Oct 3, 2021 19:30 PDT)

V3. Plan of Action – Post Validation

PLAN OF ACTION – POST-VALIDATION
(Sixth-Year Evaluation)

DEPARTMENT: **Mathematical Sciences** PROGRAM: **ENGINEERING**

In preparing this document, refer to the Plan of Action developed by the discipline/program during the self-study, and the recommendations of the Validation Team. Note that while the team should strongly consider the recommendations of the validation team, these are recommendations only. However, the team should provide a rationale when choosing to disregard or modify a validation team recommendation.

Identify the actions the discipline/program plans to take during the next six years. Be as specific as possible and indicate target dates. Additionally, indicate by the number each institutional goal and objective which is addressed by each action plan. (See Institutional Goals and Objectives) The completed final plan should be reviewed by the department as a whole.

Please be sure the signature page is attached.

RECOMMENDATIONS TO IMPROVE STUDENT LEARNING OUTCOMES AND ACHIEVEMENT	Theme/Objective/ Strategy Number AHC from Strategic Plan	TARGET DATE
1. Offer classes increasingly more flipped to increase in-class problem solving.	SLS2, IR3	Fall 2022
2. Hold office hours in new MESA/STEM Center	SLS 3,45,6,7	Spring 2022

RECOMMENDATIONS TO ACCOMMODATE CHANGES IN STUDENT CHARACTERISTICS	Theme/Objective/ Strategy Number AHC from Strategic Plan	TARGET DATE
Enrollment Changes		
3. Continue to develop part-time faculty pool to ensure courses covered.	SLS 2, IR1	Ongoing
Demographic Changes		
4. Continue to encourage student involvement in MESA/STEM	SLS 2,3,4,5,6,7,8	Ongoing
5. Continue to encourage student involvement in professional organizations (Society of Women Engineering (SWE), Society of Hispanic Professional Engineers (SHPE), etc.)	SLS 2,3,4,5,6,7,8	Ongoing

RECOMMENDATIONS TO ACCOMMODATE CHANGES IN STUDENT CHARACTERISTICS	Theme/Objective/ Strategy Number AHC from Strategic Plan	TARGET DATE
Curricular Changes		
6. Develop Intro to Engineering design component (add to or supplement to ENGR 100).	SLS 2,3,4,6	Fall 2022
7. Develop a 3-unit MATLAB course	SLS 1,2,3,4,6, IR3	Fall 2022
8. Develop a 3-unit Engineering Computer Aided Drafting and Design Course	SLS 1,2,3,4,6, IR3	Fall 2023
Co-Curricular Changes		
10. Investigate requirements of Architecture majors, vis-à-vis physics requirements.	SLS 2,3	Fall 2021
Neighboring College and University Plans		
12. Submit LSAMP Bridges to the Baccalaureate proposal.	SLS 2,3,4,5,6,7, IR2	Fall 2020 (DONE)
13. Work with universities and other community colleges to improve connections	SLS 3,4,6	Ongoing
Related Community Plans		
14. Continue to develop connections with local engineers and companies.	SLS 3,4, E1	Ongoing

RECOMMENDATIONS THAT REQUIRE ADDITIONAL RESOURCES	Theme/Objective/ Strategy Number AHC from Strategic Plan	TARGET DATE
Facilities		
15. Reduce noise of M-212 blowers.	SLS 2,3,4, IR4	Fall 2021
16. Locate new office upon ending Department Chair term.	SLS 2,3,4,5,6,7 IR4	Spring 2023
Equipment		
17. Locate and install impact tester	SLS 2, IR3	Fall 2021
18. Create loaner lab equipment/supply kit for ENGR 162 and ENGR 171 (COVID), ~ENGR 162: ~$100/kit; ENGR 171: ~$500/kit	SLS 2,6	Ongoing
19. Software: MATLAB - Annual Community and Technical College license, 40 seats @ $40/seat = $1600/year	SLS 2,6, IR3	Annually
20. 3D Printers for projects (e.g., MakerBot Replicator) 3 @ $1,999 each	SLS 2,6, IR3	Spring 2022

Staffing 21. Hire Lab Technician to support program. $40,000 - $80,000 22. Develop part-time faculty pool	 SLS 2, IR1 SLS 2, IR1	 Fall 2021 Fall 2021

PLAN OF ACTION – Post-Validation

Review and Approval

Plan Prepared By

Dominic Dal Bello Dominic J Dal Bello Date: 9/30/2021

Reviewed:

Department Chair*

Dominic Dal Bello Dominic J Dal Bello Date: 10/15/2021

*Signature of Department Chair indicates approval by department of Plan of Action.

Reviewed:

Dean of Academic Affairs

Sean Abel Date: 10/26/2021

Vice President, Academic Affairs

Robert Curry Robert Curry (Nov 9, 2021 18:36 PST) Date: Nov 9, 2021

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Final Audit Report 2021-11-10

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