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## Engineering

Cycles included in report:  
Cycle #3 8/1/14 to 7/31/15

Program Name: Engineering  
Program Cycle: #3 8/1/14 to 7/31/15

## 1 Program Summary

For the most recent three academic years, JCCC Institutional Research (IR) reports the following:

Number of full-time faculty: 2  
Number of adjunct faculty: 1

The percent of students completing ENGR who enrolled in them:

Year 2011/12 - 90.2%  
Year 2012/13 - 93.5%  
Year 2013/14 - 97.5%

Of the completers, the percent of students who were successful in the ENGR courses:

Year 2011/12 - 93.5%  
Year 2012/13 - 91.0%  
Year 2013/14 - 91.0%

The student credit hours generated by ENGR courses:

Year 2011/12 - 353 credit hours  
Year 2012/13 - 368 credit hours  
Year 2013/14 - 271 credit hours

The ENGR program costs per credit hour were:

Year 2011/12 - not given  
Year 2012/13 - \$89.55 per credit hour  
Year 2013/14 - \$431.55 per credit hour

Engineering [PDF 659 KB 9/2/14]

HandbookProgramReviewFall2014 [PDF 2,136 KB 9/2/14]

### 1.1 Degree Offerings

JCCC does not offer an A.S. in engineering since a four-year degree is required to be employed as an engineer. However, engineering transfer students can earn an A.A. in Liberal Arts from JCCC before transferring. Also, students who transfer before earning an associate degree at JCCC can use reverse transfer agreements in place with a number of universities to earn their associate degree while attending the transfer university.

### 1.2 Certificate Offerings

No certificates are offered within the engineering program.

## 2 Program Resources

Students who enroll in ENGR courses have the use of the restricted-use Computer-Aided Drafting (CAD) Program Lab on campus. This lab contains computers loaded with all software needed for all the ENGR courses.

Also, the engineering department has up-to-date land surveying equipment including a total station and survey grade GPS.

## 3 Reflection on Institutional Data

### ENGR FACULTY

According to the IR report, we currently have three faculty members, two full-time and one part-time. This is misleading. The faculty members teaching ENGR courses are as follows:

Faculty member 1: full-time JCCC faculty who also acts as chair. ENGR courses and chair duties make up approximately 70-80% of this faculty member's total workload per year.

Faculty member 2: full-time JCCC faculty who only teaches one ENGR course as overload during summer semester.

Faculty member 3: adjunct JCCC faculty who teaches one ENGR course per academic year.

## COURSE COMPLETION AND SUCCESS

Generally, the students taking ENGR courses are academically prepared for college level work. Each ENGR course has prerequisites. Since students must take other college level courses before taking an ENGR course, we continue to have good completion and success rates of over 90%. ENGR 254 Dynamics has a lower success rate than the other ENGR courses. Dynamics is one of the most challenging courses taught at JCCC and sometimes students are not prepared to spend the amount of time this course demands. A number of students go to school full time and also work. When taking a course like Dynamics, that is not a good situation.

## ENGR STUDENT CREDIT HOURS GENERATED

The number of student credit hours for the most recent three years are 353, 368, and 271. The number of credit hours dropped significantly in the past year. This is due to the deletion of the civil engineering technology AAS degree. All the ENGR courses are considered transfer courses. However, the civil engineering technology degree required two ENGR courses, ENGR 131 and ENGR 180. Since the deletion of the AAS program, most of the loss of credit hours comes from the ENGR 131 and 180 courses.

Students coming to the JCCC campus for a program such as the now deleted civil engineering technology degree are directed to one of two degree programs. The CAD drafting and design AAS degree program prepares students to work as an engineering technician in a design firm (just as the now deleted civil engineering technology degree did.) The recently developed construction management AAS degree program prepares students for supervisory positions in the construction industry.

This loss of credit hours was expected and should not be taken as an indication of a decrease in the number of engineering transfer students on the JCCC campus.

## ENGR PROGRAM COST PER CREDIT HOUR

The cost per credit hour is based on faculty salary/benefits, program supplies, technology purchases, and division overhead. For the most recent three academic years, IR reports the ENGR program costs per credit hour were:

Year 2011/12 - not given

Year 2012/13 - \$89.55 per credit hour

Year 2013/14 - \$431.55 per credit hour

These numbers do not reflect the actual cost per credit hour. The number for the 2012/13 year includes 0% of the salary and benefits for the full time faculty member whose workload is approximately 70-80% in the ENGR program. Hence, the \$89.55/credit hour is far too low.

The number for the 2013/14 year includes 100% of salary and benefits for the full time faculty member whose workload 80% in the ENGR program for the year. Hence, the \$431.55/credit hour is too high.

Institutional Research and the budget office were not able to produce better data prior to completion of this report.

## ENGR DEPARTMENT NUMBER OF STUDENTS

The number of students who are on the JCCC campus and plan to transfer to a four-year engineering degree program is very hard to quantify. Each discipline of engineering requires different courses. For example, mechanical engineering students take some of the same courses as civil engineering students during the first two years but not all of the same courses. There is no set two years of courses for the first two years of an engineering degree.

Because there are a number of different engineering disciplines, it is not feasible for JCCC to provide the variety of courses which would be necessary to meet the requirements of the first two years of an engineering degree for each engineering discipline and which would transfer to all three of the engineering universities in the state. We attempt to offer courses which the greatest number of engineering transfer students can utilize. The majority of these courses are in the MATH, PHYS, ENGR, and CHEM departments. Of course, while the students are taking these technical courses, they also help fill the general education courses.

It is possible for an engineering transfer students to not even take any ENGR courses in their time at JCCC. Some students transfer after one year if they are in a discipline for which we do not offer many sophomore level courses. Other students, such as chemical engineering majors, do not take any ENGR courses at JCCC since no JCCC ENGR courses are required for that discipline. However, our department serves as a resource for all engineering transfers students. We provide engineering programs each semester and are available for career planning. Our presence of campus increases the awareness in the community that JCCC has courses for engineering transfer students.

In summary, the number of students enrolled in ENGR courses is only a portion of the engineering transfer students on the JCCC campus. We often have more students attending one of our engineering program events than the total number of students enrolled in ENGR courses that semester. This just shows there is a much larger body of engineering transfer students on campus than the number of students enrolled in ENGR courses indicates.

Institutional Research and the admissions/enrollment office may be able to work together to quantify the actual number of engineering transfer students on campus. However, at this point that data is not available.

#### **4 Student Success**

Engineers apply principles of science and mathematics to develop economical solutions to technical problems. Their work is the link between scientific discoveries and commercial applications.

Students who desire to work as a licensed professional engineer must graduate from a four-year engineering school. JCCC provides these students with many classes which transfer to area engineering schools.

Generally students working towards a degree in engineering are strong in the math and science disciplines.

Many engineering transfer students take the following courses at JCCC:

Calculus I, II, and III, Linear Algebra, Differential Equations

Engineering Physics I and II

Chemistry

Engineering Graphics (ENGR course)

Statics and/or Dynamics (ENGR courses)

Land Surveying (ENGR course)

Computer Science

English Composition I and II

Social Science and Humanities electives

##### **4.1 Define Student Success**

Quantitatively, student success could be measured by the percent of students desiring to transfer to a four-year engineering school who actually do transfer. However, this data is not currently available so

this measure of student success is impossible to quantify. In order to quantify this number, Institutional Research and the admissions/enrollment office would need to be able to identify the academic major transfer students intend to pursue. The engineering department understands that this is not currently being tracked so we have no way of quantifying the number of engineering transfer students on campus.

However, JCCC does track the percent completion rate for students enrolled in engineering (ENGR) courses. For the most recent three academic years, the student completion rate in ENGR courses has always been above 90% (ranges from 90.2% - 97.5%)

Qualitatively, we measure student success by the lives we improve. Engineering students at JCCC come from many different backgrounds and follow many different paths to attain their goal of transferring into a four-year engineering program. Here are just a few of our stories of current and former students (names have been changed to protect privacy.) James is a single father who wants to show his boys they can do anything if they put their mind to it. James is a strong leader in the engineering club and has great, creative ideas for the club. Without his leadership, the club would not be the success it is. Jose was a brilliant honors student who realized he needed to work on being more comfortable in group settings. He sought out opportunities at JCCC that would take him out of his comfort zone. These included presenting his honors work to the entire class and joining a student organization. Sandy is still trying to decide what type of engineering she is interested in. She has also met with the chair of the engineering department on numerous occasions to discuss engineering disciplines and also used the career center to find information on salaries and job forecasts.

#### **4.2 Achieve/Promote Student Success**

Students thinking about engineering need information to decide if engineering is right for them. Also, once a student has decided to pursue a Bachelor of Science degree in engineering, they often need information about how to transfer to a four-year college.

JCCC has worked closely with area engineering colleges and has developed transfer agreements. We have program guides for the area universities. For example, if a student wants to major in civil engineering at University of Kansas, we have a program guide which lists the classes they can complete at JCCC which will transfer to the civil engineering department at KU.

JCCC also has two academic counselors (Shirley Wing and Mary Kessler) in the Student Success Center who specialize in assisting engineering transfer students.

The students enrolled in ENGR courses have a very good completion rate of over 90%. Engineering students tend to be more prepared for college and hence complete at a high rate.

#### **4.3 Successful Transfer**

There are three accredited engineering schools in Kansas which grant a Bachelor of Science degree in engineering, University of Kansas (KU), Kansas State University (KSU), and Wichita State University (WSU.) These three schools, along with University of Missouri Kansas City, UMKC, look to JCCC for engineering transfer students.

JCCC has agreements with each of these universities (and others) to accept courses completed at JCCC into their engineering programs. There are Program Guides for each university which list the courses a student should take at JCCC for each specific engineering major. These program guides are accessible on the JCCC public website under the Transfer Information Page.

Two years ago, the Kansas Legislature approved legislation to address the state's engineering workforce shortage by expanding the capacity of the engineering schools at KSU, KU, and WSU. The University Engineering Initiative Acts goal is to increase the number of engineering graduates by 60% over 10 years within the State of Kansas. The Kansas Board of Regents has begun working with the three engineering colleges on this initiative. For more information, see the Board of Regents website.

During the past 18 months, we have had an increased interest from both KU and KSU for recruiting JCCC's engineering students. The four-year engineering schools are receiving large amounts of

funding and other support from the state to expand their programs. They want and need more JCCC engineering transfer students for their growing programs.

We received no Institutional Research data showing the number of students intending to major in engineering who transfer to a four-year engineering college.

## 5 Assessment of Student Learning Outcomes

ProgramReviewSLO [XLS 42 KB 9/3/14]

### 5.1 Reflection on table provided on assessment.

Student learning outcomes assessment is now taking place in most of the ENGR courses. They have been taking place for at least one year. Before that, the department's focus was on assessing civil engineering technology (CET) courses.

SLO #7 (select and apply appropriate problem-solving techniques) is being assessed in the following courses:

ENGR 251 Statics  
ENGR 254 Dynamics

SLO #8 (use technology efficiently and responsibly) is being assessed in the following course:  
ENGR 131 Engineering Graphics

Assessment techniques used by this department include:

Embedded questions in tests/homework  
Pre/post tests

### 5.2 Significant Assessment Findings

For the Statics course, the data showed that the majority of students are able to determine the proper equation which should be used to solve a particular problem. However, some are having trouble determining the type of vector to use or are making mathematical errors during the process.

For the remaining courses the same assessment questions has not been asked for enough semesters to determine true trends.

### 5.3 Ongoing Assessment Plans

In the Statics course, extra emphasis is being placed on determining the type of vector to be used. During the course, the instructor is emphasizing vector types and how to select the correct type to use in a solution. Also, extra study material has been added to the Learning Management System (LMS) so students can work on this topic outside of class. As this is assessed over the next few semesters, the department hopes to see an improvement.

Assessment will continue for the same SLO for each course until a trend is seen. Then, as we did with the civil engineering technology courses, we will address any weaknesses.

ENGR 251 Statics SLO Report 2013-14 [DOC 93 KB 9/3/14]

## 6 Curriculum Reflection

All ENGR courses are transfer courses. Therefore, we are very careful to not alter a course without first determining if the modification will negatively affect the transfer status.

In order to maintain the transferability of our courses, we endeavor to use the same texts and cover the same material as the same course at the four-year engineering colleges.

### 6.1 Honors Contract(s)

There are currently two ENGR courses with honors contracts:

ENGR 251 Statics  
ENGR 254 Dynamics

## 6.2 New Course Offerings

At this time, there are no new ENGR courses in development.

## 7 Faculty Success

### 7.1 Departmental Accomplishments

The ENGR department is committed to helping students decide if engineering is right for them and then helping them meet their goal of earning a four year engineering degree.

In addition to providing courses, the engineering department plays a vital role in the engineering student community on campus. The program provides information and activities for any student interested in the engineering field.

One method we use to connect with engineering students is through the JCCC Student Engineering Club. The club facilitates recruiting visits from engineering school recruiters each semester. These sessions allow students to see what it takes to be successful in a four year program and how to transfer to that program. The club also sponsors guest speakers who talk about all areas of engineering. These events include "I'm good at math and science, is engineering for me?" and "What do engineers really do?" This semester, we had 34 students attend a session about engineering transfer opportunities to the University of Kansas and 28 students attend "What do engineers really do?" These types of activities help students make informed academic plans.

Also, the program is the face of JCCC engineering for the community. When community members contact JCCC and have questions about engineering, our department is a valuable resource. The department has provided speakers for the Young Womens Conference hosted by JCCC each autumn.

### 7.2 Faculty Accomplishments

The ENGR chair has been investigating sustainability and how to incorporate it into existing courses. She attended a regional stormwater management best practices conference and incorporated new material into her courses. She then attended the National STEMtech Conference and presented Integrating Sustainability in a Technical Course.

Concerning curriculum, the department chair serves as the JCCC liaison for engineering courses taught through the JCCC College Now program which provides JCCC courses taught at high schools. She also serves on the college-wide international education council which promotes an international curriculum.

In order to expand her knowledge of outcomes assessment, she attended a regional Learning Outcome Assessment conference. Her institutional level of service to the college included membership on the Student Learning Outcomes Assessment council whose focus is to help faculty-driven assessment process expand to all divisions across campus.

She also served as chair and a panel member for a peer review panel. Each new faculty member must be reviewed by a peer review committee during the second and third years of employment. The panel meets often to provide instructional, collegial and professional support to the new faculty member and to review his progress. This is a faculty-run review which spans three semesters. In addition to serving as a member on a peer review panel, she is the technology divisions representative on the college peer review council. The council sets policy and procedures for JCCCs formal peer review process.

She has been particularly interested in working with local high school districts. She has reviewed

existing and implemented new Career Pathways and Project Lead The Way (PLTW) agreements between school districts and JCCC.

### 7.3 Innovative Research, Teaching or Community Service

Each year, the department chair donates approximately 25 hours to help prepare and run the annual Competitive Technology Event (CTE.) The CTE hosts over 500 students who come to campus and compete in over 30 career-related events.

The engineering department chair currently serves on the Shawnee Mission School District PLTW Advisory Board and the Blue Valley School District Pre-engineering Advisory Board.

Professors who teach ENGR courses make good use of the college's Learning Management System D2L. It is utilized in all face to face courses and used as a resource for students. D2L holds course notes, problem solutions, additional study material and student progress information.

## 8 Goal Setting and Action Plan

### 8.1 Long-term Goals

Maintain a course completion success rate of over 80%.

#### *General Outcomes Links*

#### **Key Performance Indicators** Campus-wide KPIs

3 - Persistence

Persistence Fall-to-Fall

#### 8.1.1 Actions/Resources Required

Chair of ENGR will meet with each ENGR faculty member and discuss retention strategies such as students getting timely feedback on work. Chair will assist any instructor to resolve issues which prevent students from being successful in the course.

#### 8.1.2 Updates on Long-Term Goals

This long term goal is new so there are no updates.

### 8.2 Long-term Goals

Schedule engineering recruiters from the three Kansas engineering colleges to visit JCCC at least once a year. We have done this for one year and need to have a goal to continue to do this.

#### *General Outcomes Links*

#### **Key Performance Indicators** Campus-wide KPIs

Full-time Graduate and Transfer

Full-time Graduate and Transfer (3-year cohort)

2 - Part-time Graduation and Transfer

Part-time and Graduation and Transfer (6-year cohort)

4 - Student Satisfaction

(Measured by Noel-Levitz Student Satisfaction Inventory) on the following indicators: Instructional Effectiveness Registration Effectiveness Concern for Individual Academic Advising/Counseling Safety and Security



### 8.2.1 Actions/Resources Required

Chair of ENGR will work with the JCCC Engineering Club to continually schedule and market recruiter visits.

### 8.2.2 Updates on Long-Term Goals

This long term goals is new so there are no updates.

## 8.3 Long-term Goals

Submit request to Program Review Office to begin identifying and tracking engineering transfer students so we can quantify the number of students. Also, submit request to begin tracking what institution the engineering transfer students transfer to and their success rate at each of those institutions.

*General Outcomes Links*

**Key Performance Indicators** Campus-wide KPIs

Full-time Graduate and Transfer

Full-time Graduate and Transfer (3-year cohort)

### 8.3.1 Actions/Resources Required

During the fall of 2015, chair of ENGR will write request for tracking engineering students and submit it to the program review office. If and when this request is completed, the chair of ENGR will work with any JCCC offices which require assistance to complete and monitor the tracking.

### 8.3.2 Updates on Long-Term Goals

This long term goal is new so there are no updates.

## 8.4 Short-Term Goals

In the 2014/2015, 2015/16, and 2016/2017 academic years, meet with any non-ENGR department full time instructors who are not conducting SLO assessment in their ENGR courses to discuss an assessment plan.

*General Outcomes Links*

**Key Performance Indicators** Campus-wide KPIs

5 - General Education

Mastery Progressing Low or No Skills

### 8.4.1 Actions/Resources Required

ENGR chair will meet with other ENGR instructors to set up an assessment plan which can be implemented the following year.

### 8.4.2 Updates on Short-Term Goals

This goal is new so there are no updates.

## 8.5 Short-Term Goals

In the 2014/15 and 2015/16 academic years, review current textbooks to ensure they comply with the technology division non-discrimination policy

*General Outcomes Links*

**Key Performance Indicators** Campus-wide KPIs

**Indicators**

4 - Student Satisfaction (Measured by Noel-Levitz Student Satisfaction Inventory) on the following indicators: Instructional Effectiveness Registration Effectiveness Concern for Individual Academic Advising/Counseling Safety and Security

**8.5.1 Actions/Resources Required**

ENGR chair and assistant dean will review current textbooks to ensure they comply with the new technology division non-discrimination policy

**8.5.2 Updates on Short-Term Goals**

This goal is new so there are no updates.

**8.6 Short-Term Goals**

In the 2014/2015 and 2015/2016 academic years, review the program transfer information for engineering for KU, KSU, and WSU to make sure it is up to date and accessible to students and the public.

*General Outcomes Links*

**Key Performance Indicators** Campus-wide KPIs

Full-time Graduate and Transfer	Full-time Graduate and Transfer (3-year cohort)
2 - Part-time Graduation and Transfer	Part-time and Graduation and Transfer (6-year cohort)
4 - Student Satisfaction	(Measured by Noel-Levitz Student Satisfaction Inventory) on the following indicators: Instructional Effectiveness Registration Effectiveness Concern for Individual Academic Advising/Counseling Safety and Security

**8.6.1 Actions/Resources Required**

ENGR chair will review transfer guides from the point of view of a student to determine if information is up to date and accessible.

**8.6.2 Updates on Short-Term Goals**

This goal is new so there are no updates.

**9 Accreditation Standards**

The ENGR program provides courses for transfer and does not offer a degree. Therefore, there is no special accreditation. ENGR courses are accepted by the three Kansas universities (and others) which offer bachelor degrees in engineering. The three Kansas universities are all accredited by ABET, the national body which accredits engineering programs.

**9.1 Specialized Accreditation**

Not applicable

**10 Resource Request/Adjustment**

As of November 2015, the department chair was not given any budget data for the attached table.

BudgetChart [XLS 2,000 KB 9/2/14]

### **10.1 Long-range Adjustment to Resources**

Currently, the ENGR department has up-to-date equipment so we are not requesting any new funds for equipment.

We do not foresee a change in faculty nor a large change in course offerings so the budget should not change much in the next year.

### **10.2 Educational Technology Support**

Technical support for the current learning management system (LMS) is used by ENGR faculty. It is vital to have resource where we can get answers to our questions about the LMS.

We also rely heavily on teaching in smart classrooms and expect that all computers and AV equipment is kept in good, working order.

The software requirements for our courses are currently being met by having AutoDesk software installed in the classroom and CAD lab. Other software we are using is public domain and requires no license. At this time, we do not see a need to request new hardware or software.

End of report