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Instructional Program Review

Program Name: **Drafting Technology**

Program Contact: **Vorobey, Lilya**

Academic Year: **2013-2014**

Status: **Submitted**

1. Description of Program

Provide a brief description of the program and how it supports the college's [College Mission and Diversity Statements](#), [Institutional Priorities, 2008-2013](#), [5 in 5 College Strategies, Spring 2011](#), and other [Institutional Program Planning](#) as appropriate.

Drafting is common to all manufacturing and construction activities. The drafter interprets the engineer's, architect's, interior designer and industrial designer's ideas, presenting them in the language of manufacturing and construction.

The CSM Drafting Department offers three distinct sequences for students. Which sequence a student selects depends on their career technical and/or educational goals.

Aligning with the Board of Trustees' Core Value of a Student Centered Mission, as well as College of San Mateo's Mission Statement, students may choose an AA, AS degree or a Certificate of Achievement study track.

Drafting 121 and 122 (CAD using AutoCAD) is a two-sequence course of study which is designed for students majoring in Architecture, Industrial Design, Interior Design as well as updating drafting skill sets needed in our community.

Drafting 113 (REVIT), a Building Information Modeling course caters to architects, plumbers, building contractors, inspectors, electricians and project managers as well as students of architecture and interior design.

Drafting 110 and 111 (SolidWorks), a 3D modeling track is for industrial designers, engineers, architects and the community working in the machining and fabrication trades. This includes prototype shops and the medical device production industry.

All drafting classes transfer to CSU and will fall under Area E5d career exploration, and self-development section of the AA/AS Degree requirements (to be included in the next CSM catalog).

The CSM Drafting Department, in support of the 5 in 5 College Strategies, is currently providing early entry to high school students as well as increasing CTE outreach and community collaborations with student internships opportunities.

2. Student Learning and Program Data

A. Discuss Student Learning Outcomes Assessment

Reflect on recent SLO assessment results for courses and degrees and certificates offered by the program. Identify trends and discuss areas in need of improvement.

All of our drafting courses have real life based technical problem solving projects. SLOs are assessed via quizzes, project and homework assignments. We have found that students who have not had a technical (hands on) drafting course do not do well in visualizing and do not complete assigned projects as well as those who have had practice in sketching. Thus, a one unit sketching and visual thinking course will be added to the curriculum. In addition to training students in theoretical concepts for understanding the basics of software programs, we will be adding the social construction of community based projects, with the intention of having them make inquiries in the social, cultural, and political aspects of design processes used in their field of study such as architecture, interior design and building construction.

DRAF 110 SLOs**SLO1: *Use SolidWorks drawing and detailing options.***

95% of students met this outcome with minor mistakes due to "attention to details" such as having a dimension line or annotation cross a dimension, incorrect use of precision and tolerances.

SLO2: *Apply ANSI drafting standards to projects using SolidWorks tools.*

Since the ANSI standards are embedded in the software, there are minor drawing mistakes that a small percentage of students 3% do not take into consideration when completing their drawings. Attention to detail is a difficult thing to master in CAD drawings.

SLO3: *Construct problem-solving skills to master the creation of drawings and assemblies.* 90% mastered this assignment on their first try.

SLO4: *Judge and select correct drawing processes and procedures to synthesize and integrate information in drawings and assemblies.*

90% of students were able to create a drawing to print without further instruction after the first lecture. The amount of steps required to complete a drawing varied by the approach taken by individuals. Each Solidworks drawing can be approached in many ways, thus some drawings will have larger files even though the end result is the same product. The ability to create a part in the least amount of steps is the most difficult thing to master.

Evidence shows that those students who read about the topic, finish the homework assignments, and watch You Tube tutorials outside of class are nearly 100% successful in accomplishing the student learning outcomes. This suggests that the instructional materials and teaching demonstrations are sound when outside study is engaged by the students. The students who do not have or do not make the time to do so eventually drop the class. Since all of the drafting classes meet for six hours per week, an additional six to twelve hours per week of study is needed for the students to firmly grasp the difficulty of the programs. CAD programs are equated to learning a foreign language or learning how to play a musical instrument. Not only is there the repetitive nature of each command through keystrokes and mouse work, there is the drawing concepts at hand that require critical thinking to produce a working set of drawings. If a student has a full time job and a family and attempts to succeed in our courses, they show a resolute dedication that is above the average student at our institution.

Where SLO results were not at 100%, lack of participation is the most predominant factor leading to a student's non-success in a specific topic. Most of these students are non-native speaking students who are embarrassed at not being able to ask questions.

In order to make it easier for the students, the department has considered shortening the courses and adding additional courses in the sequence in order to cover the content. The result is that we have found that complete immersion into the programs is still the best method of learning these new computer aided drawing and design languages.

DRAF 111 SLOs**SLO1: *Use drawing and detailing options such as sections, details and auxiliary views.***

100% of the students were able to complete this project without any additional help after the first introduction. Second semester Solidwork students work independently as though they are in a work place and are asked to trouble shoot problems within a team situation. The instructor is the last resort for most of the problems.

SLO 2: *Apply engineering standards and sheet standards to a project using SolidWorks.*

100% of the students were able to complete this project without any additional help.

SLO3: *Build multiple part and assembly structures that will interact with drawings, design tables and bill of materials.*

100% of the students were able to do this project. The degree of detail work varies and is dependent on student's abilities to understand the complicated file linking variables.

SLO 5: *Create appropriate drawing views to best show details in all model configurations.*

100% of the students were able to do this project.

SLO 6: *Create surface modeling basics such as datum curves, datum points, and 3D sketches.* This particular SLO is perhaps the most difficult to teach since attempting to create 3D models using surfaces on a computer would be best studied in a physical lab where students make a model prototype before they attempt to create it using the software. 3D visualization varies from person to person thus most students take longer to understand the complex rules governing this type of drawing. 82% of the students were able to complete the first drawing in this series without any help after the first demonstration.

SLO 7: *Utilize SolidWorks surface features to create complex solid geometry.*

82% of the students were able to complete this project in the allotted time. Surfacing in Solidworks is very difficult in that the program is not suited to minute discrepancies. The drawing must be exact for surfaces to work properly.

DRAF 121 SLOs

SLO 1: *Apply appropriate software file management procedure.*

100% of the class was able to navigate the PC in order to copy files onto their thumb drives as well as the hard drive. In every class, there is always a handful of students who are able to navigate the web yet have no idea what is hidden behind the start icon in the PC operating system. These are the students who at the end of the course are the most happiest since they not only learned the software program but also realized that they are capable of understanding what is hidden in the little black box with the screen.

SLO 2: *Create drawings using the drawing and edit commands of the AutoCAD drafting software.* 85.7% of students were able to create the assigned drawings. Two students were having difficulty with polar entry methods. Again, this particular program is dependent on a student memorizing specific keystrokes while critically thinking their way out of a particular design problem.

SLO 3: *Apply ASME Y14 Standards in dimensioning and tolerancing of drawings.*

85.7% of the students were able to use the Dimension Style dialog box to create new dimension styles for use in their drawings after the first lecture. This topic is an underlying theme in AutoCAD and is used in the creation of dimensioning styles, text styles, leader styles, etc. Those students who have not completed a hand drawing class that provides the construction basics of each formatting style are the ones who have the trouble of seeing the overall picture of how to use these skills since they are busy attempting to learn the basics.

SLO 4: *Create and use symbol libraries in drawings.*

Even though 80.9% of the students were able to find the Design Center and use the blocks without any trouble, AutoCAD does not make the path to this file available if the program was newly installed on a computer (as we do each semester in the lab). Understanding the file structure inside the program files is difficult for most. Most students do not experiment for fear of harming the program files. We have found that an explicit tutorial on how to find these files for the first time was necessary.

SLO 5: *Create architectural drawings for a residential structure.*

76% of the students had difficulty in formatting the multi-lines. This is a new command in AutoCAD and is not intuitive. In addition, students have found that creating architectural drawings requires a considerable amount of drawing time compared to producing mechanical drawings.

SLO 6: *Develop mechanical drawings using orthographic and isometric methods.*

85.7% met this criteria without additional instruction. Those who had difficulty are spatially challenged. That is they have difficulty seeing 3D representations in 2D. This part is very important in CAD and should be covered in more depth. Again, a hands on drawing class where the students prepare paper models would be beneficial for all of the courses.

Students interested in our drafting degree or certificates are having difficulty obtaining them in a minimal amount of time since not all of the required courses have been offered in a timely manner due to lack of enrollment. Lack of enrollment in the second semester classes has to do with the fact that we only offer one section of the beginning classes. In addition, during this submission cycle, we reduced the program to two evening classes (DRAF 110 & 111 were taught at the same time in one lab) since I received release time in order to help

with SLO/TracDat for the technology department.

In this next cycle (2013-2014), we already have more students interested in the degrees and certificates as well as higher enrollment since we have a new course, DRAF 113 that is peaking the interest of many architectural firms in the area.

We need to add a day program in addition to our evening program that will feed into our second semester courses.

B. Student Success Indicators

1. Review **Student Success and Core Program Indicators** and discuss any differences in student success indicators across demographic variables. Also refer to the **College Index** and other relevant sections of the **Educational Master Plan: Update, 2012**, e.g., Student Outcomes and Student Outcomes: Transfer. Basic Skills programs should also refer to **ARCC** data.

The successful completion rate for Fall and Spring 2010-2013 DRAF courses in was 65.9%, 63.6%, and 70.8% respectively with an accumulated average is 67.6%. DRAF courses have a 79.4%, 85.3% and 80% retention rate respectively. On average this means DRAF is only 1.5% below the college's 83.9% retention rate.

Regarding other measures, DRAF students are similar to the college overall with younger students (19 years or less and 25-29) having the lowest success rates while older students (20-24, 30 – 50+) have the highest successful course completion rates.

Students in the DRAF courses are more often returning students attempting to re-evaluate their skill set. Thus they are not interested in transferring, although, those who do transfer generally list something other than DRAF as their majors and are not entered into our transfer rates.

All DRAF courses have approximately a 5.3 to 1 male to female ratio. The success rate of males and females is about the same at approximately 67% (2010-2013). This is not Rocket Science. We all know that women are not encouraged to go into the mechanical design, industrial design, architecture, engineering and construction fields.

The top three ethnic groups in the DRAF courses are White (49.2%), Hispanic (18.5%), and Filipino (9.2%). At the college level these groups have 30.4% (White), 7% (Filipino), and 19.7% (Hispanic).

2. Discuss any differences in student success indicators across modes of delivery (on-campus versus distance education). Refer to **Delivery Mode Course Comparison**.

Currently all of the drafting classes are lecture / lab. On line courses would be difficult to offer since beginning courses require a considerable amount of guidance in mouse and command usage. For example, one command will require a student to use both the left mouse button, right mouse button as well as the center wheel. This is something that would be difficult instruction in a virtual setting since understanding what the student is doing wrong is easier to correct when watching the student first hand. A large percentage of our students have actually attempted to take an on-line course only to find that the physical lab time provides them with immediate corrections to their learning obstacles via the instructor or adjacent student.

C. Program Efficiency Indicators. Do we deliver programs efficiently given our resources?

Summarize trends in program efficiency as indicated in the **Student Success and Core Program Indicators** (LOAD, Full-time and Part-time FTEF, etc.)

DRAF LOAD dipped in 2012-13 when the full time faculty member was on release time to oversee SLO and TracDat for the Technology Department. The difference in 2010-11(363.1LOAD) and 2011-12 (402.3 LOAD) 2012-13 (275.9 LOAD) was due to only two classes being taught in 2012-13 rather than three.

The department has one full time faculty. Since we have not been able to offer second semester courses due to low enrollment (not enough first sections to secure 20 students for the second course), we have not offered the second semester courses that would normally employ two adjunct faculty.

We have been reduced to one lab which has made it difficult to offer second semester sections. Our day time program was discontinued when a full time professor retired. The discontinued welding program and manufacturing technology programs provided the instructor of record in this department.

3. Additional Factors

Discuss additional factors as applicable that impact the program, including changes in student populations, state-wide initiatives, transfer requirements, advisory committee recommendations, legal mandates, workforce development and employment opportunities, community needs. See [Institutional Research](#) as needed.

The Advisory Committee has recommended that we offer REVIT - a CAD program that is recommended preparation (in addition to AutoCAD) for architectural related employment. This course was offered in Fall 2013.

The major issue drafting program faces is the lack of a second computer lab that can support the large software programs as well as yearly software updates. This situation has put the program in jeopardy since without these needs, the goals of providing students with up to date variety of courses that include a second semester of a track is impossible. The implementation of a day program to support filling second semester courses depends on having an additional lab. This with a marketing program to specific student populations could produce a viable program.

Living in the Bay Area provides the opportunity to hire faculty who are involved in the latest technology advancements. Yet the ever changing nature of software programs that support the industries also require professional development.

4. Planning

A. Results of Program Plans and Actions

Describe results, including measurable outcomes, from plans and actions in recent program reviews.

A DRAF 111 SolidWorks II class was added to the curriculum in 2011 although filling the class with the required 20 students has been problematic in that we are only offering one section of beginning course which then creates a low enrollment in the second semester courses. In addition we have added a DRAF 133 REVIT class that is now in its second semester (Spring 2014). We have to publicize our courses since students mention that they find out classes by chance.

B. Program Vision

What is the program's *vision* for sustaining and improving student learning and success over the next three years? Make connections to the [College Mission and Diversity Statements](#), [Institutional Priorities, 2008-2013](#), and other [Institutional Program Planning](#) as appropriate. Address discussion in the Student Learning and Program Data section: SLO assessment results and trends in student success indicators.

[Note: Specific plans to be implemented in the next year should be entered in C of the Planning section.

CTE programs must address changes in the context of completion and employment rates, anticipated labor demand, and any overlap with similar programs in the area as noted in D1 and D2 of the Career Technical Education section.]

In the next three years to continue our efforts to schedule and maintain a wide breadth of drafting courses that meets the needs of our diverse student population. We will be marketing the program with CSM's marketing department to veterans, handicapped persons, as well as industrial designers, architects, interior designers as well as engineers. As the department grows, we will be able to add advanced courses or summer courses in order to maintain interest in the program. The department is a one person department and only is offering only three courses. In the future, we will strengthen partnerships with business and industry through the Advisory Board to be able to offer more courses.

1. To guide future faculty and staff development initiatives, describe the professional activities that would be most effective in carrying out the program's vision to improve student learning and success.

There are a number of seminars available for CAD/Drafting instructors that provide the latest developments in the field. These seminars are attended yearly by both the fulltime as well as the adjunct instructors.

The ever-changing nature of the software programs requires retraining and rethinking of curricula. Faculty spends off time learning new programs, creating course work without the aid of support from the college.

2. To guide future collaboration across student services, learning support centers, and instructional programs, describe the interactions that would help the program to improve student success.

Availability of open computer labs that are able to support the software programs would benefit students who are unable to afford copies of the programs or computers that are able to support the size requirements of the CAD programs.

Currently outside job boards are used to help students find internships and fulltime employment.

3. To guide the **Institutional Planning Budget Committee** (IPBC) in long-range planning, identify any major changes in resource needs anticipated during the next three years. Examples: faculty retirements, equipment obsolescence, space allocation.

See the Resource Requests section below to enter itemized resource requests for next year.

Leave sections blank if no major changes are anticipated.

Faculty

Equipment and Technology

Computer station requirements will have to be updated as the CAD software programs improve. An additional computer lab will be needed to address new courses added to the evening program.

Instructional Materials

A 3D printer and scanner comparable to what industry uses would benefit the students in visualizing their projects.

Classified Staff

Facilities

New carpeting for the 19-110 lab to replace the ripped carpet. Building 19 has poorly maintained restrooms.

C. Program Plans and Actions to Improve Student Success

Prioritize the plans to be carried out next year to sustain and improve student success. Briefly describe each plan and how it supports the **Institutional Priorities, 2008-2013**. For each plan, list actions and measurable outcomes. (Plans may extend beyond a single year.)

Plan 1

Title:
Improve Student Success

Description
<ol style="list-style-type: none"> 1. Improve the academic success of all students 2. Improve degree and certificate completion rate

Action(s)	Completion Date	Measurable Outcome(s)
Develop and offer DRAF 113	Spring 2014	More varied yet comprehensive student skill level for the job market

Plan 2

Title:
Promote Academic Excellence

Description
<ol style="list-style-type: none"> 1. Improve readiness for employment 2. Improve transfer rates

Description
Market the program courses to high schools, employers and the community.

Action(s)	Completion Date	Measurable Outcome(s)
Visit High Schools to market program	Spring 2014	More students, better outcome
Send out flyers to employers	Spring 2014	Community awareness of our program.

Action(s)	Completion Date	Measurable Outcome(s)
Connect with employers for internships	Spring 2014	Offering links to internships will prepare students for employment.
Offer courses that will complete the degree requirements.	Spring 2015	Added courses will allow students to complete degrees and certificates.

Plan 3

Title:

Epson projector ceiling mounts for 19-110 and 19-104 labs	\$200.00

Instructional Material

Description	Cost
Autodesk Subscription Renewal	\$1770.00
Autodesk Technical support (\$695.00)	\$695.00
Solidworks Subscription Renewal	\$1961.25

Classified Staff

Description	Cost

B. Website Review

Review the program's website(s) annually and update as needed.

Faculty contact(s)	Date of next review/update
Lilya Vorobey	Yearly

C. SLO Assessment Contacts

Faculty contact(s)	Date of next review/update
Lilya Vorobey	Spring 2014