INSTRUCTION PROGRAM REVIEW: SPRING 2013 SUBMISSION CYCLE

Program Name: Drafting Technology
Faculty Contact: Lilya Vorobey

Academic Year: 2011-2012
Program Review Submission Date: March 25, 2013

I. 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 planning documents 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.

II. Summary of Student and Program Data

A. Student Learning Outcomes Assessment

Summarize recent SLO assessments, identify trends, and discuss areas in need of improvement.

Currently classes offered (Draf 110, 111,121,122) and a new course, Draf 113 (Fall 2013) 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 accomplishing assigned projects. Thus, a one unit sketching and visual thinking course has been submitted to COI and will be added to the curriculum in 2013-2014.
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.

94% of students met this outcome with minor mistakes due to "attention to details" such as having a dimension line or annotation cross a dimension.

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

Again since the ANSI standards are embedded in the software, there are minor drawing mistakes that a small percentage of students (6%) do not watch over. 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.

93% mastered this assignment on their first try. We should be able to have 100% of the class do this project without any difficulty.

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

89% of students were able to create an exploded drawing ready to print without further instruction after the first lecture.

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

Note: Since there were only two students in the second section (taught simultaneously with the beginning DRAF 110 class) the SLO results for this course taught in Spring of 2013 are not valid. We need more offerings of each beginning class to then be able to fill a second semester course in DRAF 110-111 and DRAF 121-122

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.
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. Since there are only two students in the second section (taught simultaneously with beginning class), the are the independent capable students.
SLO3: Build multiple part and assembly structures that will interact with drawings, design tables and bill of materials.
All 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.
All students were able to do this project. This is an SLO that actually can be deleted from the second semester of study since it is covered in depth in the first semester.
SLO 6: Create surface modeling basics such as datum curves, datum points, and 3D sketches.
All students were able to do this project. 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.
SLO 7: Utilize SolidWorks surface features to create complex solid geometry.
All students were able to do this project. The two students were very proficient in the first semester and have been in the design field, thus were able to understand all of the concepts taught in this course.

DRAF 121 SLOs
SLO 1: Apply appropriate software file management procedure.
95% 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 one or two 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.
89% 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.
88% 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 93% 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.

77% of the students had difficulty in formatting the multilines. 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.

83% 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.

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 2009-2012 DRAF courses in was 69.5%, 65.9%, and 63.6% respectively with an accumulated average is 66.3%. DRAF courses have a 86.3%, 79.4%, and 85.3% retention rate respectively. On average this means DRAF is only 1.3% below the college's 84.8% 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 4.5 to 1 male to female ratio. This compares to the college male to female ratio of 4 to 5. The success rate of males and females is about the same at approximately 67% (2009-2012). This is not Rocket Science. We all know that women are not encouraged to go into the mechanical design, industrial design, engineering and construction fields.

   The top three ethnic groups in the DRAF courses are White (58%), Hispanic (43.6%), and Asian (15.6%). At the college level these groups have 33.8% (White), 18.5% (Asian), and 22.9% (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 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 2010-11 when the full time faculty member was on medical leave. The difference in 2009-10 (466 LOAD) and 2011-12 (402.3 LOAD) was due to only two classes being offered in 2011-12 rather than three compared to the college LOAD average of 539.

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 use the 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.

D. Course Outline Updates

Review the course outline update record**.** List the courses that will be updated in the next academic year. For each course that will be updated, provide a faculty contact and the planned submission month. See the Committee on Instruction website for course submission instructions. Contact your division's COI representatives if you have questions about submission deadlines. Career and Technical Education courses must be updated every two years.

Courses to be updated	Faculty contact	Submission month
All courses have been updated.	Lilya Vorobey	April 2014
DRAF 110 Soldiworks I	Lilya Vorobey	April 2014
DRAF111 Soldiworks II	Lilya Vorobey	April 2014Tab to add rows
DRAF 121 Computer Aided Design I	Lilya Vorobey	April 2014
DRAF 122 Computer Aided Design I	Lilya Vorobey	April 2014
DRAF 113 REVIT	Lilya Vorobey	April 2014

E. Website Review

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

Faculty contact(s)	Date of next review/update
Lilya Vorobey	December 2013

F. Additional Career Technical Education Data – CTE programs only. (This information is required by California Ed. Code 78016.)

1. Review the program's Gainful Employment Disclosure Data, External Community, and other institutional research or labor market data as applicable. Explain how the program meets a documented labor market demand without unnecessary duplication of other training programs in the area. Summarize student outcomes in terms of degrees, certificates, and employment. Identify areas of accomplishment and areas of concern.

At this time DRAF has an AA/AS degree and a Certificate of Achievement and all of the DRAF courses are CSU transferable. Since drafting is no longer a stand-alone occupation, those entering our course of study may list other transferring majors. In San Mateo County, our courses provide instruction for not only students, but architects, engineers, mechanical and industrial designers, interior designers and aerospace designers.

Employment of drafters is expected to grow 6 percent from 2010 to 2020 (U.S. Occupational Handbook), slower than the average for all occupations since engineers, industrial designers and architects are now learning the software programs thus "drafting" is no longer a stand-alone occupation. Developments in software programs used by "drafters" and other professionals are changing the nature of drafters' work and how this work will have to be done. Thus, it is imperative that we market to touch specific industries such as electronics, architecture, interior design, industrial design and engineering.

2. Review and update the program's Advisory Committee information. Provide the date of most recent advisory committee meeting.

The Drafting Advisory Council met on October 31, 2012 Members present were:

Robert Scheren, AIA Architect, Dean & Professor Emeritus, Kent State University
Jason Hill, Fly SFO, CAD Manager
Jeff Payne, SFO Airport, CAD Manager, Adjunct Faculty
Jason Silva, Student Representative
Lilya Vorobey, Faculty
Dean Kathy Ross

At this meeting, the board gave the department several suggestions based on the college providing a new computer lab. The main objective was to offer Autodesk's REVIT software which is considered to be a "major plus" in job interviews for architects, electrical engineers, plumbing designers, contractors, H-Vac, mechanical and structural design of buildings. Since then we have implemented the course into our curriculum as well as our degrees and certificates.

III. Student Learning Outcomes Scheduling and Alignment

A. *Course SLO Assessment*

Explain any recent or projected modifications to the course SLO assessment process or schedule.

All courses have SLOs and assessment is being done by full-time faculty on an ongoing basis. No adjustment or modifications are projected in this schedule. Classes taught by adjuncts have SLOs but since the courses have not been taught, there is not a projected plan for assessment, though SLOs will be assessed each time the courses are taught.

B. Program SLO Assessment

Explain any recent or projected modifications to the program SLO assessment process or schedule.

We have recently revised the program SLOs and will be including them in current documentation and courses. They are as follows:

Technical Competency:

1. Demonstrate an understanding of industrial design and drawing methods and techniques.
2. Prepare technical drawings using computer-aided drafting (CAD) and design software.
3. Analyze information to develop solutions to technical aspects of design problems.

Interpersonal Skills:

4. Verbally communicate ideas and concepts in an organized manner.
5. Create clear drawings and research papers.
6. Work in teams to problem-solve specific design problems.

Professional Awareness:

7. Students should be aware of their professional and ethical responsibilities affecting their design completion for specific project that involve the community.

C. SLO Alignment

Discuss how Course SLOs support Program SLOs. Discuss how Course and/or Program SLOs support Institutional/GE SLOs. Refer to TracDat related Program and Institutional SLO reports.

The Drafting Technology courses and programs align with the institutional SLOS:

	Effective Communication	Quantitative Skill	Critical Thinking	Social Awareness & Diversity	Ethical Responsibility
DRAF 110	X	X	X	X	X
DRAF 111	X	X	X		X
DRAF 121	X	X	X	X	X

DRAF 122	X	X	X		X
DRAF 113	X	X	X	X	X
DRAF 130	X	X	X		X

IV. 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 will be offered in Fall 2013.

The major issue drafting program faces is the lack of a second computer lab (that we once had) and funding for new computers as well as new 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.

V. Institutional Planning

A. Results of Plans and Actions

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

A DRAF 111 SolidWorks II class has been added to the curriculum 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. This also is the result of our DRAF 122 class. We are working on finding another suitable computer lab and the possible introduction of a day program.

B. Program Vision

What is the program's vision for sustaining and improving student learning and success during the *next six years*? Make connections to the College Mission and Diversity Statements, Institutional Priorities,

2008-2013, and other institutional planning documents as appropriate. Address trends in the SLO assessment results and student success indicators and data noted in Section II. Summary of Student and Program Data.

[*Note*: 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 Sections II.F.1 and II.F.2.]

[*Note*: Specific plans to be implemented in the *next year* should be entered in Section V.C.]

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 enrichment 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.
   The department intends to work with the CSM Career Services to better serve the DRAF students. Currently outside job boards are used to help students find internships and fulltime employment.

3. To guide the Institutional Planning Committee (IPC) in long-range planning, discuss any major changes in resource needs anticipated in the *next six years*. Examples: faculty retirements, equipment obsolescence, space allocation. Leave sections blank if no major changes are anticipated. Specific resource requests for the next academic year should be itemized in Section VI.A below.

   Faculty: Adjunct faculty will be required to teach new software programs as the program grows. There is likely to be a fulltime faculty retirement in the next six years.

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 or scanner would benefit the students in visualizing their projects.

Classified Staff: 4T

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

C. 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.

Plan 1

Title:

Revise the Drafting Certificate of Completion to complement the new course offerings as well as the banked courses.

Action(s)	Completion Date	Measurable Outcome(s)
Sending a new Certificate of Completion to COI	Spring 2012	A new certificate will attract students into completing a series of courses. The certificate will be used as a marker for prospective employers.

Plan 2

Title:

Revise the A.A. and A.S. Degrees to reflect the new course offerings.

Description

A revision of the A.A. and A.S. degrees is required to update the catalog listing, new courses as wells as banked courses.

Action(s)	Completion Date	Measurable Outcome(s)
Revise degree offerings and submit to state.	Fall 2013	Enrollment improvement

Plan 3

Title:

Market the program in order to be able to grow the program.

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	Fall 2013	Enrollment improvement
Create a brochure for marketing	Summer 2013	Higher Enrollment

For additional plans, cut/paste from above and insert here. Or add an additional page. Number your additional plans accordingly.

[Note: Itemize in Section VI.A. Any additional resources required to implement plans.]

VI. Resource Requests

A. Itemized Resource Requests

List the resources needed for ongoing program operation and to implement the plans listed above.

Faculty

Full-time faculty requests (identify specialty if applicable)	Number of positions
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Complete Full-Time Faculty Position Request Form for each position.

Description of reassigned or hourly time for prioritized plans	Plan #(s)	Cost

Equipment and Technology

Description (for ongoing program operation)	Cost
Software update: Autodesk software	$1505
Software update: SolidWorks	$1500

30 Computer station that can support the latest Autodesk and Solidworks software for an addition lab	$42,000

Description (for prioritized plans)	Plan #(s)	Cost

Instructional Materials

Description (for ongoing program operation)	Cost

Description (for prioritized plans)	Plan #(s)	Cost

Classified Staff

Description (for ongoing program operation)	Cost

Description (for prioritized plans)	Plan #(s)	Cost

Facilities

For immediate or routine facilities requests, submit a CSM Facility Project Request Form.

Description (for prioritized plans)	Plan #(s)	Cost

New carpeting 19-110 lab		???

B. Cost for Prioritized Plans

Use the resources costs from Section VI.A. above to provide the total cost for each plan.

Plan #	Plan Title	Total Cost
1		
2		
3		
	For additional plans, add rows and number accordingly.	