Computer Information System
2019-20 Annual Program Review Update
Submitted By: Mary Pape

Program Mission Statement: De Anza's Computer Information Systems department has been a leading educational institution in Silicon Valley since the college was founded. Over the years it has developed a rich and diverse series of courses in many areas. Our courses meet the needs of both the transfer student and the industry professional.

I.A.1 What is the Primary Focus of Your Program? Transfer

I.A.2 Choose a Secondary Focus of Your Program? Career/Technical

I.B.1 Number Certificates of Achievement Awarded: 53

I.B.2 Number Certificates of Achievement-Advanced Awarded: 7

I.B.3 #ADTs (Associate Degrees for Transfer) Awarded: 112

I.B.4 # AA and/or AS Degrees Awarded: 261

I.B.5 Trends in # Degrees Awarded: Number of certificates and degrees is remaining constant in spite of efforts to increase.

For the response to I.B.4 # AA and/or AS Degrees Awarded the number includes 221 Liberal Arts Degrees - Emphasis on Business or CIS.

I.B.6 Strategies to Increase Awards: Workshop is held around the beginning of registration for students to plan out their schedules. CTE counselor and transfer counselor are invited. This proves to be a good opportunity to explain about certificates and degrees students should apply for along with the courses they are completing for transfer.

We will endeavor to make sure all instructors know which certificates and degrees the classes they teach apply to.

Work with A & R to reduce time for student from application to receipt of certificates. Students do not see the point of seeking a certificate if they need to wait 3+ months for it to be received. They have applied since they want it to apply for a job.

I.C.1. CTE Programs: Review of Perkins Core Indicator and SWP Outcomes Metrics: 070710 - Computer Programming (2019-2020 Core report)
De Anza performed well above the negotiated performance levels in the following core indicators:
Core Indicator 1 – Technical Skill Attainment (exception was down 1.4% for students with disabilities)

Core Indicator 2 – Completions
Core Indicator 3 – Persistence and Transfer

We fell below in
Core Indicator 4 – Employment
Non-Traditional Participation/Completions (5a/b)

Of the 34 outcome: 14 above the District negotiated level,7 below, and 13 NA/NR

Program Improvements
Work with OTI to provide paid internships for students
Work with DSPS to ensure best environment for students with disabilities
Using mentor, reach out to industry in the way of finding possible internships for our students and in assisting students in preparing for interviews in the tech world.
070810 - Computer Networking (2019-2020 Core report)
De Anza performed above the negotiated performance levels in the following core indicators:
Core Indicator 1 – Technical Skill Attainment
Core Indicator 2 – Completions
Core Indicator 3 – Persistence and Transfer

We fell below in
Core Indicator 4 – Employment
Non-Traditional Participation/Completions (5a/b)

Of the 34 outcome: 5 above the District negotiated level, 5 below, and 24 NA/NR

Program Improvements
Work with OTI to provide paid internships for students
Work with DSPS to ensure best environment for students with disabilities
Using mentor, reach out to industry in the way of finding possible internships for our students and in assisting students in preparing for interviews in the tech world.
Provide opportunities to attend on-campus panel discussions and lectures presented by those from industry.

I.C.2 CTE Programs: Labor Market Demand and Industry Trends: In state of California, the number of Database Administrators , Computer and Information Systems Managers, Network and Computer Systems Administrators, Information Security Analysts, and even the entry level Computer Network Support Specialists are expected to grow much faster than average growth rate for all occupations and for other states. The growth predictions and current median incomes for these careers in the state of California are:
    -> Database Administrators and related fields projected growth rate of 24.0 percent, or 2,900 jobs

between 2014 and 2024.

>Computer and Information Systems Managers projected growth rate of 30.3 percent, or 15,200 jobs between 2014 and 2024.

>Network and Computer Systems Administrators projected growth rate of 20.6 percent, or 8,900 jobs between 2014 and 2024.

->Information Security Analysts projected growth rate between 2014 - 2024 is +19.8% or 3900 jobs annually with a current median income of $107,200

-> Computer Network Support Specialists projected growth rate between 2014 - 2024 is +20% or 20% jobs annually with a current median income of $74,600

To meet these needs the following courses have been added (and applicable certificates/degrees updated) and two new AA degrees are being created:

Mobile development:

 iOS Development course (CIS 55)

 Java for Mobile Development (CIS 53)

Database:

 Introduction to Large Scale Processing Systems (CIS 64E)

 Introduction to Big Data and Analytics (CIS 64F)

Security:

 Enterprise Security Process Management (CIS 75D)

 Enterprise Emergency Response Planning (CIS 75F)

 Ethical Hacking (CIS 102)

 Digital Forensics and Hacking Investigation (CIS 104)

 Cloud Computing

Project Management:

 Managing Cloud Projects (CIS 95F)

 Agile Project Management - A Practicum (CIS 95G)

 Certificate of Advanced Achievement and an AA in Project Management

Python Programming Language (CIS 40, CIS 41A, and CIS 41B) along with:

 Programming in Python Certificate of Achievement

Machine Learning program built on Python and introducing data science preparation and R programming language

Challenge: Cutting edge technology classes tend to draw a small number of students at first. The proposed new funding scheme favors certificate/degree completion, but several certificates/degrees include one of these low enrollment courses.

Solution: A schedule be established to offer one of these possible low enrollment courses each quarter with the salary of the instructor supported by Strong Workforce monies. Where feasible the class will be online. These classes, required for students to complete degree/certificate, must be guaranteed not

be canceled. As of now a list of such courses follows:

Network Administration Certificate of Achievement-Advanced A.A. Degree
    CIS 18B Advanced Unix/Linux (4.5)
Database Design for Developers (Oracle) Certificate of Achievement
    CIS 64C Introduction to PL/SQL (4.5)
    CIS 64D Database Tuning (3)
    CIS 64E Introduction to Large Scale Processing Systems (4)
    CIS 64F Introduction to Big Data and Analytics (4)

Challenge: Curriculum Committee timeline which does not allow for us to update curriculum to keep pace with the technological development input from our Advisory Board:
• Our Advisory Board feedback indicated that the skill of programming in Python is as much in demand as other areas such as programming in Java and web development. Python is mostly replacing the need for Perl. For 2016-17 we introduced CIS 40 for the student with no programming experience, CIS 41A and CIS 41B for the intermediate level programmer who wishes to develop Python programming skills for the workplace. The advisory board has suggested adding a sequel course with an emphasis on data analysis. We will use this suggestion to add a machine learning course in the future.
• On the advice of our Advisory Board we have revamped and renamed the quality assurance course: Software Quality Assurance. This course will be part of Web Test Engineering COA. The Advisory Board feels the certificate of achievement prepares the student well in the three main skill areas: ability to understand or learn quickly whatever language(s) the engineering team is currently using, ability to assess and debug client side browser issues, and QA best practices and methods.
• In the area of database skills our teaching of SQL is precisely what is needed as indicated by the Board. With the introduction in 2015 of CIS 64F Introduction to Big Data and Analytics, we are teaching one of the second most desired database skills, Hadoop. R Programming course and a course dedicated to analytics are suggested additions.
• Web Development certificate was considered one of the most beneficial for those without a Bachelor's degree. In the area of web development, new course Representational Style Transfer (REST) paired with JSON protocol is the suggested direction for updating and enhancing the present Web development course offerings. Ruby on Rails was suggested. More emphasis on PHP would also benefit students.
• When asked "what courses could De Anza College offer to help your company or organization address needs related to computers or information technologies", the advisory group replied with Cloud Computing, Android Development, Requirement of Analysis and Design, Data Warehousing, iPhone Development, Team Based Software Development
• Begin a program in Functional Programming including robotics.
• It should be noted that of the courses listed we teach Cloud Computing (CIS 95F), Android Development (CIS 53), Analysis and Design (CIS 28), Data Warehousing (CIS 64F), and iPhone

Development (CIS 55). It should also be noted that a team project is part of the CIS 22C curriculum.
• Only a third of respondents were willing to hire an applicant without any work experience. An internship would suffice was a comment by some. Thus, we are endeavoring to find ways to establish connection with industry to provide students possibilities for internships, paid and unpaid. These opportunities are published on the CIS Department's website: http://deanza.edu/cis/internships.html. In addition, through Strong Workforce monies a mentor has been hired to work with local companies such as Google and Facebook to build an alliance where our students are benefiting from speakers, mentors, site visits, and internships.

I.D.1 Academic Services & Learning Resources: #Faculty served: N/A

I.D.2 Academic Services & Learning Resources: #Students served:

I.D.3 Academic Services & Learning Resources: #Staff Served:

I.E.1 Full time faculty (FTEF): 8.7

I.E.2 #Student Employees:

I.E.3 Full Time Load as a %: 34.9%

I.E.4 # Staff Employees:

I.E.4 #Staff Employees:

I.E.5 Changes in Employees/Resources: While two additional full-time instructors were added to the department between 2013-14 and 2017-18, the number of students has grown so dramatically that our ratio of full-time employees to part-time employees has actually decreased by 24%. So even with a new full-time faculty member hired in Spring 2019 the percentage of full-time faculty has still decreased over the last 5 years.

Availability of rooms equipped with computers for each student to use is often the deciding factor not only for when to offer a class but if another section should be opened. While statistics for core courses suggest the majority of students prefer day classes, in recognition for the need of equity, we must still make these available in the evening. Other courses, both CTE and those that draw students primarily from those working a full-time daytime job, must also be offered in the evening. Thus, there is no room to grow our program in the 6:00 - 7:50 pm time-frame.

One way to alleviate the room issue is through offering more sections online where appropriate. However, this has brought about a significant issue in the proctoring of exams. Once again, too few rooms equipped with computers for proctoring of finals.

II.A Enrollment Trends: Although the Program Review Tool shows a 5-yr gain in enrollment of 17%, in actuality Computer Information System enrollment has leveled off with an actual decrease between 2017-18 and 2018-19. The decrease would be more except for the fact that we have added three Python programming courses. For students these tend to be three extra courses students might

take. CIS 40 is for those students who wish for an introduction to programming before enrolling in CIS 22A or CIS 36A. CIS 41A and CIS 41B teach skills focused on the special capabilities of Python and are usually taken in addition to CIS 22A & B or CIS 36A * B by students.

II.B Overall Success Rate: Over the last three years success rates have remained constant at 75%which was an increase over previous years.

Success rates for programming classes tend to be between 72% - 79% with the lowest success rate for CIS 22B.

Strategies:
1) Currently students have free access to CodeLab tutorial. On Canvas students have access to slide presentations from the textbook. Thus, even if the student cannot afford to or decides not to purchase the text the student has access to needed information. In the future we should keep with providing CodeLab tutorial. If there is another product such as ZyBooks CIS faculty need to remember that this will not be helpful to the student who cannot afford it or choose not to purchase it.

2) To improve success rates in CIS 22B faculty need to collaborate more including sharing of calendaring of topics and assignments given.

3) More authentic assessment of student work.

II.C Changes Imposed by Internal/External Regulations: The Computer Science AS Transfer Degree has been available to students since Fall, 2015. Students may follow the C++ pathway or the Java pathway to achieve the A-D-T Computer Science degree.

To assist students in completing their transfer courses including those that are part of the Computer Science A-D-T degree, CIS 22C Data Abstraction and Structures is being offered using three different approaches: exclusively with C++ code usage, exclusively with Java code usage, and language independent.

UC Irvine was the one UC demanding Python. We have worked to implement a pathway that allow students to complete a pathway in C++ or Java that is accepted by other UCs and CSUs and then complete two Python courses which prepare them to transfer to UC Irvine.

Data Science is a fast growing area. CIS Department has created a Data Science course that will be effective Fall 2020.

AA Degree for Database and Project Management as it is now approved by the state.

We continue to broaden in areas such as cloud computing and cybersecurity.

With the encouragement of offering late-start classes, we have begun to add late-start, 8-week CIS 40.

We are beginning developing noncredit courses and hope to have some approved effective Fall 2021.

With word of the quality of Project Management program, Sukhjit Singh has begun teaching courses for Cupertino employees on their site at times convenient to them. These students will be able to earn a certificate in Project Management. We do hope this leads to more bridges of our curriculum with industry.

III.A Program Success: WiCS hosted a Netflix Speaker on Monday, October 28. 2019 from 12:00 noon - 1:00 pm in Conference Room B with guest speaker Anvita Jain, a Sr. Software Engineer @Netflix.

It should be noted that as the percentage of women in our classes has increased so has their success rate which hovers at 79-80%

III.B Enrollment Trends - Equity Lens: Ratio for all CIS courses has remained the same but with Asian population increasing and white population decreasing. Enrollment percentage tends to hover around 20% for African American, Latinx, Filipinx, and Pacific Islander groups.

However, what is more telling is that for CIS 22C which all transferring computer science students must complete, the enrollment for African American, Latinx, Filipinx, and Pacific Islander groups drops to 12%.

Many students who belong to Asian, White and the other groups have had some exposure to programming: parent who works in the field, parents who make sure children take coding class either via home courses or at school, and students completing courses at high school to prepare for AP Exam in Computer Science. African American, Latinx, Filipinx, and Pacific Islander students tend not to have this background.

The "Imposter" syndrome is also a deterrent for African American, Latinx, Filipinx, and Pacific Islander student. We tend to not have programming instructors who represent this group. Being conscious when hiring faculty including part-time so that there is a diverse faculty in regards to African American, Latinx, Filipinx, and Pacific Islander students is something we will need to focus on. We will seek inclusion of African American, Latinx, Filipinx, and Pacific Islander students as student volunteer teaching assistants and paid tutors.

III.C Success, Non-Success and Withdraw Rates: The Numbers = facts:
Overall success rate falls from 75% for all students to 62% for African American, Latinx, and Filipinx Students. But what is more appalling is that success rates in the core courses (CIS 22A * CIS 22B) leading to transfer in computer science areas is about 73% for all students and about 52% for African

American, Latinx, and Filipinx Students

Strategies
1. Teaching Assistants in the lab. These are students fresh out of our first two core courses that hopefully instill the notion in a struggling student "if he/she can so can I". Teaching assistants volunteer their time for a parking permit and something for their resume. Teaching assistants are just supposed to help the student over his/her present bug. Point person: Lab Coordinators Bachlan Nguyen, Mai Kha; Chair Mary Pape. We will strive to be inclusive in terms of ethnic diversity.

2. Teaching assistant in the classroom and in online classes. Again, this is a volunteer position and it is often a previous student of the instructor. Lab Coordinators Bachlan Nguyen, Mai Kha; Individual instructors requesting tutors

3. Some students require the support of one-on-one tutoring sessions. Since Fall of 2016 we have been able to hire peer tutors. Lab Coordinators Bachlan Nguyen, Mai Kha; Chair Mary Pape

Faculty are providing more back-up assistance to students in being available more online, setting up chat sessions, rewarding students for posting to forums, available face-to-face in the lab as well as online during online times and utilizing online tutorials. Teaching Assistants have also been added into Canvas to assist in the answering of doubts and questions online.

The lab accommodates students' needs for access to computers and the Internet. The lab is designed to promote peer-to-peer support.

To close this gap further, class size in the core class needs to be kept closer to the maximum of 40. This has become difficult as students have become more dependent on sites such as Rate My Professor which does result in sections of 66, 29, 23, and 47 where the maximum is 40.

Continuance of the program offering CodeLab to programming students at no charge is important.

III.D Equity Planning and Support: Mentor to reach out to industry and develop bridges has helped to draw in more students do not normally see themselves seeking a computer science career. With such a mentor we have been able to host panel discussions with employees from Google representing diverse ethnic groups to share their stories of the road to employment at Google. We have also hosted individual speakers from industry.

III.E Departmental Equity Planning and Progress: Departmental collaborations are needed so that we ensure necessary topics are included to the proper depth. This is especially important for CIS 22A, CIS 22B, CIS 36A, CIS 41A classes.

Professional development in creating authentic assessments.

Coaching/Consultation in regards to gaining more tools to better understand and guarantee success for all students but especially for those from African American, Latinx, and Filipnix populations.

III.F Assistance Needed to close Equity Gap: Yes

IV. A. SLOAC Summary: Perfect the quizzes and tests to show more accurately what students did on the labs. This way, students who copy or have someone else do the labs for them will not get away with it from the start and will have a chance to correct their behavior long

IV.B Assessment Planning: CIS 22B, CIS 40, CIS 41A, CIS 41B, CIS 64D, CIS 67A, CIS 67B, CIS 75D, CIS 75E, CIS 79, CIS 104

V.A Budget Trends: CIS gets the FTEF that we can schedule classes for. Since the Business/CS/Applied Tech Division enjoys an increasing or flat enrollment, budget has not been the deciding issue. For us in CIS, the deciding issues are good instructors, adequate support for our students, and availability of classrooms with computers for each student.

However, we have trouble with first offerings of cutting edge courses since these often fail to meet the minimum of 20 at first. Then the certificate is not attainable for the student since the class has been canceled. In addition, the lead time for new curriculum prohibits us from being "cutting edge". We found a solution for Spring 2017 by combining funds received from Strong Workforce along with re-purposing CIS 82Z Current Topics class as Cloud Security. Unfortunately, with the focus on productivity we are no longer able to hold low enrollment classes even with the support of Strong Workforce monies.

V.B Funding Impact on Enrollment Trends: 1) For our transfer students, our core classes are over-crowded and students must often wait between taking sequential courses.
2) We are restricted in the number of cutting edge courses we can offer for those wishing to improve the technical skills in their quest for employment or expanding their career options.
3) Too few classrooms equipped with computer for each student.

V.C.1 Faculty Position(s) Needed: Growth

V.C.2 Justification for Faculty Position(s): CIS Department wishes to grow its core transfer program while simultaneously adding courses focused on cutting-edge topics. One new faculty positions is needed. Ideally, new faculty hire needs to be capable of teaching our core transfer courses while bringing to the "table" the ability to teach courses in one of our higher academic and/or career enhancement areas.

Over the previous five years ending in 2018-19 our department enrollment has grown by17% and we are teaching 35 more sections of 40 students each. During this same time period we have added only one new faculty member.

Our Cyber Security program is taught largely by part-time instructors. Furthermore, we would like to add ITIS CSU Transfer degree. The area most pressing is Security program which was begun in 2014-

15. There is a great need for this expertise. A full-time instructor poised to push for a solid security program is needed.

V.D.1 Staff Position(s) Needed: Replace vacancy

V.D.2 Justification for Staff Position(s): Instructional Associate is needed to replace a vacancy due to a retirement in December, 2013. The person needs to be well-versed in writing C++, Java, and python code in order to assist our students in the lab.

Survey indicates that students wish for more support.

V.E Equipment Requests: Equipment resource requests listed on spreadsheet

V.F Facility Request: See Spreadsheet

V.G Other Needed Resources: Resource requests listed on spreadsheet

V.H.1 Staff Development Needs: • Assistance with creating courses compliant with the CVC-OEI rubric
• Equity training that the department members could take together.
• Assistance in becoming part of LinC program

V.H.2 Staff Development Needs Justification: For the Online Educational Initiative pilot program high demand Associate Degree for Transfer (ADTs; AA-T/AS-T) courses were chosen based on their inclusion in ADTs, student demand data, and course fulfillment of transfer area requirements. CIS Department has 7 C-ID courses. Some CIS faculty are involved with developing courses for CVC - OEI.

The department has embraced the use of Canvas as our course management system. Since few of us are experts at creating courses to be delivered online, we would progress with authoring OEI accepted courses if there was a consultant to help us with this.

Equity training based on our particular subject area is needed. Based on the program review data (http://deanza.fhda.edu/ir/Program_Review_2016-17/CIS.pdf) we have made some progress in closing the target vs. non-targeted .

While our teaching assistants program and three CIS clubs do build a sense of community for many of our students a LinC program would reach out more directly to our students from the targeted groups.

V.I Closing the Loop: In addition to meeting target on all course level and program level outcome assessments, three main methods for assessment:
1) Increase success rates
2) Increase number of certificates and degrees awarded
3) Closing the gap between targeted and non-targeted groups

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