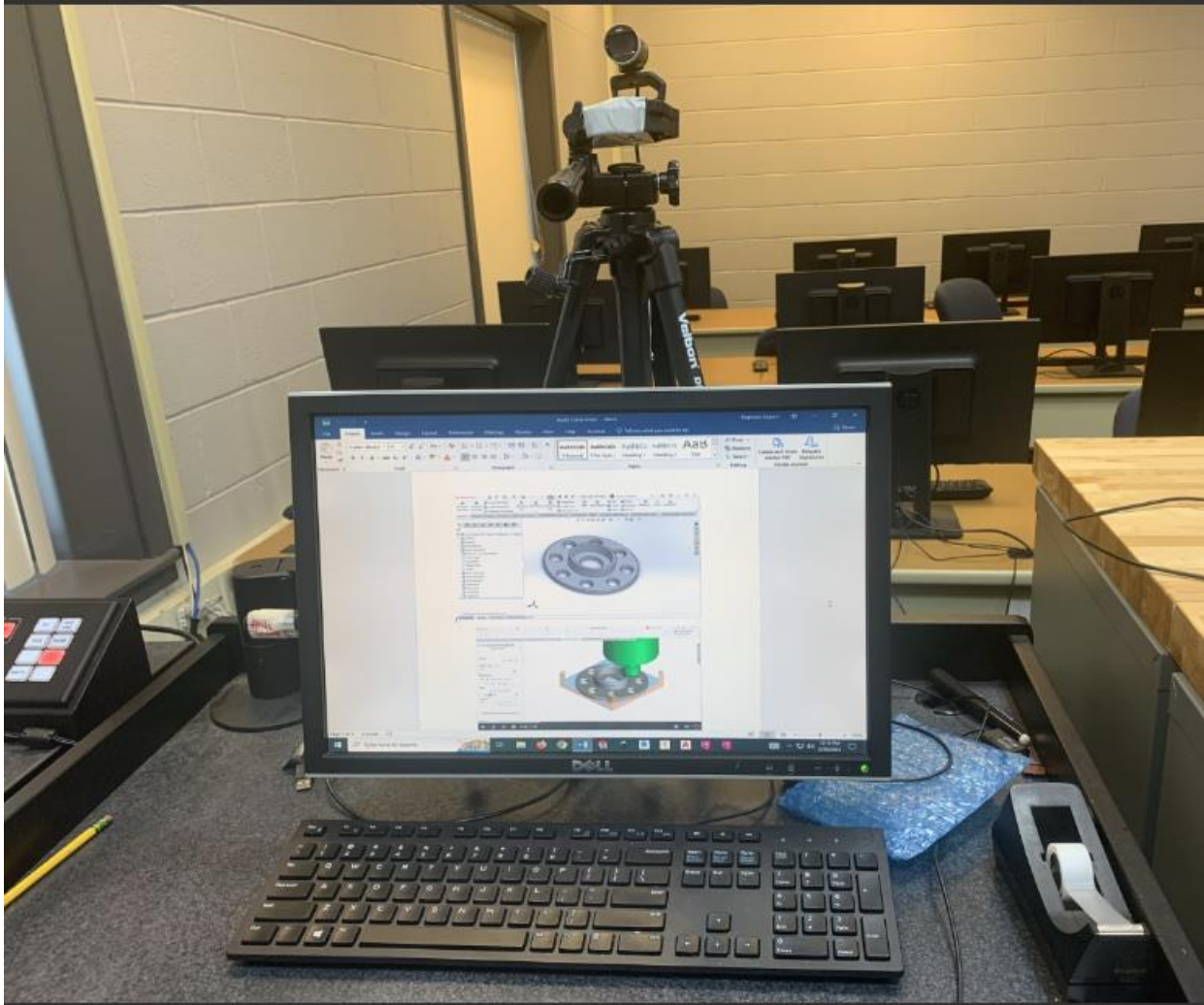


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Northampton Community College



**Computer Aided Design, Associate in Applied Science**  
**Computer Aided Design, Certificate**  
**Computer Aided Drafting Fundamentals, Specialized Diploma**

Academic Program Review

Years Covered: 2018 - 2022

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March 2023

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## I. Introduction

### A. Provide the current purpose of the program. **PURPOSE**

Students who have acquired post-secondary level skills are ready to work alongside the engineers as CAD Designers, CAD Technicians, CAD Operators, CAD Detailers or Technical Illustrators. From there, they can expect to advance to careers in a number of industries including Aerospace, Architecture, Civil, Electrical, Engineering, Fire Protection, Marine, Mechanical, Process Piping or Structural. Northampton Community College (NCC) provides the skill needed in the CAD profession by offering a curriculum that utilizes the latest software and technology including digital manufacturing and 3D Printing. Students are guided through problem-solving activities and design projects that promote individual and team effort, as well as creativity.

A Computer Aided Designer's main duty is to work alongside or assist the production or construction team in creating working drawings that are done in accordance with the standards of the organization(s) that govern that engineering or architectural discipline, as well as maintaining the company's product development needs. Designers will be responsible for the creation and improvement of assembly drawings, subassembly and component design, detail drawings, etc. A designer must work in harmony with product development engineers in performing tasks such as making the necessary changes in designs, models or drawings, or engaging in meetings that focus on design reviews.

### B. How does the program advance the mission or strategic focus areas (SFAs) of the college? (Reflect on the program's curriculum, success rates, etc. to highlight where the program specifically promotes one or more of the SFAs).

Northampton Community College is located in area where there is a high demand for college graduates who are skilled in Computer Aided Design. As technology advances, the demand for CAD jobs will increase. The design software programs are always changing and it is the designers' responsibilities to keep up with the changes. As part of meeting the needs of our area industries, one of our goals is to prepare our CAD students to be work-ready by the time they graduate from NCC.

### C. Comment on awards, honors, noteworthy accomplishments, or unique features related to the program during the review period.

In 2022, Newsweek named Northampton Community College the 54th of the top 200 online colleges and universities in the United States. Thanks in part to the increase in the number of CAD and CAD related courses that are now offered online.

### D. Catalog Description

1. The current program catalog description is included in [Appendix A](#).
2. Does this description accurately describe the current program?

Yes  No

If No, what changes does the program review committee recommend?  
Explain reasons for any recommended changes.

## E. Previous Program Review

1. Provide the date of the last program review: September 2017
2. List the recommendations from that review and indicate the extent to which these recommendations have been implemented. Indicate "I" for recommendations implemented, "IP" for those in progress, and "NI" for those not implemented. For those recommendations not implemented, please explain the circumstances.

Table 1. Status of Recommendations from Last Program Review

Recommendation	Status
Continue including 2D AutoCAD and both Inventor and SolidWorks in the curriculum.	I
Improve value to students by changing the focus of later AutoCAD centered courses from 3D solid modeling techniques to introducing CAD drafting and design examples from other disciplines.	I
Include a brief overview of drafting techniques from other countries. This would be helpful for larger corporate employers, who may work with engineering documentation that use different drafting standards and techniques.	I

## II. Program Outcomes

A. Program-Level Student Learning Outcomes (see [Appendix B](#)).

1. Have the PLOs been updated or revised since the last program review?

Yes \_\_\_\_\_ No  X

2. If yes, briefly explain the rationale for the changes (e.g., improving accessibility conforming to best practices, etc.)

## B. Program-Level Performance Indicators

1. Describe the key indicators used to assess the quality and effectiveness of your program relative to its core purpose and the college mission. Best practice is to utilize 8-10 key performance indicators.

At a minimum, provide data related to retention, persistence, completion, and transfer/job-placement/licensure in [Appendix C](#) (year over year trend data for the last five years). Then select four to five other indicators as applicable to include in [Appendix C](#) as well. Suggestions include:

Indicators of Student Success:

In every CAD course, the students meet the benchmark to pass the AutoCAD Certification Exam should they be required to take the exam prior to employment

Transfer/job-placement

Some manufacturing industries in the area are very particular about employing our students because of how satisfied they are with the performance of our students that are already working for them.

Employer Feedback/Placement Reports (Career Services)

### III. Environmental Scan

A. Identify current trends in the program's field or discipline.

The post Covid (2021-2022) economy shows that workplaces are having problems filling the positions that require minimal skills. Such companies are resolving to offer sign-on bonuses to attract workers. As a result, many of CAD students are citing the sign-on bonuses as a reason for forgoing college.

B. What has the program done to respond to these trends?

In a 2022 survey conducted by the Program Manager for CAD-CAM Technologies, 27 of the 32 prospective CAD students who decided to forgo attending NCC in favor of earning the sign-on bonuses said they would register for CAD courses if the courses were offered online. As such, we are now offering as many as possible CAD courses online to give our students the flexibility to take classes and work at the same time.

We are incorporating more training in 3D CAD to meet the demands of area manufacturing industry community.

We are reaching to the area manufacturing industries who are interested in offering our students part-time positions, to give them opportunities to continue taking classes at NCC to earn their Associate in Applied Science (AAS) in CAD.

C. Does the program have any external transfer articulation or joint admissions agreements?

Yes   X        No       

If yes, complete Table 2.

Table 2. Top five program-to-program articulation agreements.

Name of the Institution	Type of Agreement	Average number of students who transfer here each year	Date agreement was last reviewed or updated
Bloomsburg University of Pennsylvania	Upon earning AAS in CAD, students may continue at Bloomsburg to earn Bachelor's in Technical Leadership	0	2018

Have any problems been encountered concerning the transferability of courses?

Yes \_\_\_\_\_ No  X

If yes, specify the nature of these problems.

D. Does the program have any inbound articulation agreements?

Yes  X  No \_\_\_\_\_

If yes, complete Table 3.

Table 3. Inbound articulation agreements.

Name of the Institution	Type of Agreement	Average number of students who transfer here each year	Date agreement was last reviewed or updated
Monroe County Technical Institute, Bartonville PA	Articulation	0-1	2021
Lehigh Carbon Technical Institute, Schnecksville PA	Articulation	0-2	2022
Career Institute of Technology CITVT, Easton PA	Articulation	2-3	2022

CAD students from these institutions are eligible for credits for CADM100 – Engineering Graphic Essentials, CADM115 – Computer Aided Design I, and CADM205 – Computer Aided Design II for up to 9 CAD credits.

E. Provide regional workforce data with respect to (1) the number of people currently employed in the field; (2) projections for employment growth or decline; and (3) the current salary range. Discuss the implications of these numbers for the program.

As of 2021 (last data collected by Alumni Engagement Placement Report, the demand for jobs is expected to grow through the next decade. Salary is expected to be higher than average during this period. The industries with the greatest demand for CAD technologists are architecture, manufacture, civil, medical and media.

Number of graduates: 6

Employed in field of studies: 3

- F. Does the program have any community partnerships or other associations or memberships of note?

Yes \_\_\_\_\_ No  X

If yes, describe the nature of these relationships

- G. Does the program have an advisory committee?

Yes  X  No \_\_\_\_\_

If yes, list the names and affiliations of the advisory committee members

Brandon Vinyard, Monroe County Technical Institute, Bartonsville PA

Christopher Ruben, Lehigh Carbon Technical Institute, Schnecksville PA

Brett Morrison, Career Institute of Technology CITVT, Easton PA

Christopher Rehrig, Mechanical Design Manager Abec, Bethlehem PA

Andy Kim, Director, Victaulic, Eaton PA

Jim Reinhart, D'Huy Engineering, Inc., Bethlehem, PA 18018

- H. How often does the advisory committee meet? Once a year

Minutes from the last two meetings are in [Appendix D](#).

Specify advisory committee contributions to the program's growth and development, including recommended curricular changes.

## IV. Curriculum

- A. Curriculum Matrix

1. The program's most recent curriculum matrix for the program's learning outcomes can be found in [Appendix E](#).
2. The key abilities matrix (see [Appendix F](#)) indicates how the program satisfies NCC's general education core requirements.
3. Based on the curriculum matrix and general education core review, are there any changes that need to be considered?

Yes \_\_\_\_\_ No  X

If so, describe these changes.

B. Program and co-curricular maps are in [Appendix G](#) and [Appendix H](#).

1. Based on the program map, validate the adequacy of the organized, intentional, sequential learning experiences.

First-time students in the CAD program start with courses that address the history of drafting and CAD in the early days, understanding and applying the standards of the professional organizations that have established the particular CAD discipline, and learning how to manually develop orthographic views of simple parts.

The skills learned in the beginning courses are then carried over to creating working drawings of simple parts with the CAD software.

The early courses that are listed above prepare the students for courses where they learn how to create 3-Dimensional drawing with parametric software programs. Finally, the students learn to use additive machines like 3D printers and subtractive machines like CNC to make replicas of the parts that were designed with parametric software programs.

2. Based on the co-curricular map, discuss the relationship between student learning and co-curricular experiences.

Many of our students have part-time or full-time jobs, which leaves them with little or no time to participate in activities outside of school work. The students are pre-occupied with applying the skills learned in college, as soon as they get employed in their fields of studies. As such the students look forward to participating in career fairs where they apply their newly acquired skills to prospective employers.

3. Are there any changes to the program map or co-curricular map that need to be considered?

Yes \_\_\_\_\_ No   X  

If so, describe these changes.

C. Discuss career development and experiential opportunities for students within your program (e.g., internship, capstone, career research courses, service learning, etc.).

We are currently working with several area industries to develop paid internship positions that will lead to full-time position upon graduation with AAS degree in CAD.

1. Based on a review of these opportunities, are there any changes that need to be considered?

Yes   X   No \_\_\_\_\_

If so, describe these changes.

To be competitive in the job market, CAD students need to have fundamental skills in Robotics, Architectural CAD, Civil CAD and Fusion 360. All these fundamental skills will be covered in CADM210 – CAD III



## D. Modality Awareness

1. If courses are being offered in online or hybrid formats, discuss the assessment of the effectiveness of these formats.

Teaching CAD courses using online and hybrid formats are considered very effective by students who want to keep their jobs while taking college courses for the following reasons:

The online CAD courses incorporate screen capture method that simulates the how the commands are selected and applied, and the streaming video method that shows the instructor as he/she teaches the subjects. Using these two methods in combination are considered the next best thing to being in an in-person classroom or lab.

In a hybrid class, some students may opt to come to campus on class days and some may opt to attend remotely using the Zoom method. Not only that the instructor teaches both groups simultaneously, the instructor, the in-class students and remote students communicate with one another using Zoom video conferencing system. The best of all, the entire lecture for each day is recorded should any student want to revisit that day's lessons.

2. Are there any changes to these formats that need to be considered?

Yes \_\_\_\_\_ No   X  

If so, describe these changes.

## V. Assessment

- A. Append the current version of the program's Assessment Plan ([Appendix I](#)).
- B. Using Table 4, provide a summary of the assessment activity that has occurred since the last program review.

Table 4. PLO Assessment based on a 4-point Likert Scale: Excellent Above Average Average Fail

Program Learning Outcomes (include all program outcomes that are listed in the College Catalog)	Describe how the outcome has been assessed in the last five-year period.	What have been the results of that assessment?
CADM115 – Computer Aided Design I  Demonstrate an ability to work independently and apply interpersonal and technical skills to solve problems.	Classroom assignment	Student identified their preferred methods of selecting tools - Excellent
CADM230 – Parametric Modeling Inventor I  Exhibit proficient 2D drafting, 3D modeling, and computer skills in using several current industry standard CAD software such as but not limited to AutoCAD, Inventor and/or SolidWorks to create mechanical designs for product parts, assemblies and models, applying appropriate drafting standards, dimensioning and tolerancing for same.	Homework	Students practiced tool accessing outside of class – Above average
CADM220 – Parametric Modeling SolidWorks I  Applies 3D parametric modeling techniques to create a digital prototype of the project and use rapid prototyping or similar technology to create a physical prototype of the design.	Lab	Students simulated working in the industry - Average
CADM230 – Parametric Modeling Inventor I  Utilize analysis tools included in the CAD software perform simple analysis of parts, and dynamic motion analysis of assemblies to detect interferences of assembled parts.	Classroom assignment	Students learned to analyze parts - Excellent
CADM210 – Computer Aided Design III  Exhibits competent technical vocabulary, graphical techniques and knowledge applicable to a variety of engineering disciplines, including mechanical, electronics, architectural, civil and others.	Research and critical thinking	Students learned that CAD skills can be applied in all engineering disciplines. – Above average
CADM100 – Engineering Graphics Essentials  Competently uses verbal and written presentation skills utilizing appropriate presentation tools (model, sketches, drawings, visual aids, etc.) to convey design concept, product features, problems encountered and resolved, and features of a design.	Online assignment	Students learned to address CAD issues in such a way that they make sense to those who are not in the engineering profession - Excellent

<p>CADM125 – Manufacturing Processes</p> <p>Understanding of the basic design process, work breakdown structure (WBS), time management, project scheduling, analyzing and researching data in an acceptable and standardized manner as it relates to Engineering Design.</p>	Lab	<p>The students understood that there is no one absolute method to accomplish working drawings that meet the standards of the particular engineering discipline - Excellent.</p>
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

- C. What programmatic changes have been implemented as a result of recent programmatic assessment activities?

The first CAD course that the students in CAD program take covers the theories of drafting. The students get to apply design practices in the second CAD course. Many of the students were having problems transitioning from the first CAD course to the second CAD course.

- D. Identify desired changes as a result of programmatic assessment that have yet to take place.

As a result, we now incorporate fundamentals of design practices in the theories of drafting course. Having the design fundamentals experience helps students have a seamless transition into the second CAD course.

## VI. Students

- A. Describe full-time and part-time enrollment trends since the last program review or the past five years.

Table 5. Student Enrollment Data

Academic Year					
<u>FALL</u>	2018	2019	2020	2021	2022
Full-Time Students	15	16	19	10	8
Part-Time Students	22	22	16	18	17
Total Fall	37	34	35	28	25
<u>SPRING</u>	2018	2019	2020	2021	2022
Full-Time Students	12	10	14	6	10
Part-Time Students	22	29	16	19	11
Total Spring	34	39	30	25	21

- B. Describe enrollment trends regarding student age, gender, race, and socio-economic status since the last program review or the past five years.

This Data is not available

- C. Describe any concerns the program review committee has regarding: (1) any enrollment trends mentioned above or (2) other enrollment-related issues.

Although, there has been no Advisory Committee meeting in a while, the current trend shows increase in demand for students with high school vocational education in CAD credentials. This hampers our recruitment and retention efforts.

- D. Has the program instituted any methods or materials to encourage and increase applications by new students since the last program review or the past five years?

Yes   X        No       

If yes, please describe any initiatives.

I regularly speak at the CTE/Vocational Education centers to inform them about the articulation agreements that we have with their schools. The articulation agreements that we have with the school make possible for the NCC CAD program to accept at least, three of the high school CAD courses should the want to pursue AAS at NCC.

I show the high school students evidence that on the long run, accepting a CAD position with a college degree pays 1-1/2 more than as someone with a high school diploma only.

- E. Has the program instituted any methods or materials to encourage and increase the recruiting of continuing students to choose this program major or emphasis?

Yes   X        No       

If yes, please describe any initiatives.

There is a demand in our area for our students who have credentials such as Certificate in CAD, but do not yet have Associate in CAD. As such, we started teaching all the CAD certificate courses online and every semester, in order to meet the employers' needs at the soonest possible time.

A recruitment video for the CAD program is currently being produced.

- F. Comment on graduation rates since the last program review or the past five years.

Graduation rate was high and steady up to 2021 but has leveled off as the US job market experiences a high demand for workers.

- G. Comment on transfer rates for students who have and who have not graduated from the program.

In 2022, the Program Manager for CAD-CAM Technologies posed this question to the 21 students who declared as major as CAD: What are your plans for after earning your AAS in CAD at NCC?

Twenty of them responded that they would prefer to work in the CAD profession, and one said would transfer to a four-year college to pursue a B.S degree in Engineering.

- H. Discuss your program's engagement with and impact of new student orientation, advising, tutoring support, library services, disability support, student life, and career services.

Prior to taking their first CAD courses at NCC, students generally attend orientation which addresses among other things, advising, tutoring support, library services, disability support, student life, and career services. These orientation activities help new students adapt to the college environment long before the start of classes for the semester.

## VII. Physical and Financial Resources

- A. Comment on the availability, adequacy, and use of learning tools, such as computer software, instructional media, laboratories, studios, etc.

The program uses the current version of software, and the current version is constantly updated to meet the needs of the needs of the industries who are interested in employing our graduates.

- B. Discuss the adequacy of (1) instructional space, (2) office space, (3) instructional supplies, and (4) equipment for the program.

Currently, we cannot implement any new technology equipment due to classroom space.

Instructional supplies and equipment are adequate

- C. Discuss library resources.

None used

- D. Comment on the role of marketing and public relations in supporting the program.

There has been increase in the market for computer aided designers. Area industries like Abec, Victaulic and D'Huy are interested in hiring our grads because we teach many of the skills that are considered to be essential by those industries. The marketing and public relations department are currently developing promotional videos to publicize what we do to prepare students for the CAD profession.

- E. Program costs and income.

Table 7. Financial Data

Academic Year	FY2022	FY2021	FY2022	FY2019	FY2018
<b>Program Income</b>					
Tuition	*96,937	92,197	108,737	136,001	108,394
Local Reimbursement	19,793	17,315	18,383	23,110	17,988
Operating Reimb.	46,661	42,381	44,585	54,062	41,071
<b>Total Income</b>	163,391	151,893	171,705	213,173	167,453
<b>Program Costs</b>					
Direct Costs	165,289	164,523	115,606	153,683	109,828
Indirect Costs	86,717	74,059	81,538	105,534	77,323
<b>Total Costs</b>	252,006	238,583	197,143	259,218	187,152
<b>FTE</b>	17.77	17.51	21.38	27.50	22.41
<b>Income per FTE</b>	9,193	8,676	8,031	7,750	7,472
<b>Cost per FTE</b>	14,179	13,627	9,221	9,425	8,351
<b>Inst. Avg. Cost per FTE</b>	10,058	8,901	7,820	7,933	7,075
<b>Rank</b>	13 of 126	15 of 138	40 of 135	37 of 133	39 of 126
<b>Income over Expense</b>	(88,615)	(86,900)	(25,438)	(46,045)	(19,699)

- Due to low enrollment during this period.

1. Describe how the program is financed, including college budget (if any) as well as any grants that have been received over the past five years, and outline any major expenses over the past five years.

Yearly consumables are funded with operating and capital budgets. Perkins grant funding is used for replacing aging equipment as well as for purchasing new equipment that are similar to the ones that are used in the industries.

2. If possible, analyze the program's cost-effectiveness (i.e., does current/projected student enrollment cover the cost of faculty, supplies, etc. and/or are the faculty staff, space and/or facilities appropriate for the current/projected enrollment).

No. The drop in the number of students requesting the AutoCAD Certification exam as well the cost of consumable materials as laser and 3D printing materials have impacted the cost effectiveness of the program.

3. Are you getting additional funding from grants or donors?

Yes. The CAD program receives some funding for capital expenditure through Perkins.

## VIII. Human Resources

- A. Briefly describe Program Leadership and oversight.
- B. Report the numbers of full-time and part-time faculty, professional staff, and clerical staff currently associated with the program.

The CAD program has 1 (one) program manager and 3 (three) adjunct (part-time) professors

Table 8. Faculty Demographic Data

Academic Year	Last Review	Current Review
2018 - 2019		1 full-time, 5 part-time
2019 - 2020		1 full-time, 4 part-time
2020 - 2021		1 full-time, 3 part-time
2031 - 2022		1 full-time, 3 part-time
2022 - 2023		1 full-time, 3 part-time

1. Note any changes that have occurred in these numbers since the last program review or the previous five years.

Adjuncts are brought onboard as needed

2. Briefly explain how these changes have affected the program.

This change has no effect on the CAD program

- C. What is the ratio of full-time to part-time faculty? What percentage of (1) day sections, (2) traditional evening/weekend sections, (3) distance education/hybrid sections, and total sections are taught by full-time faculty. Comment on the levels of full-time, part-time faculty, and professional or clerical staff.

### Full-time Vs Part-time

Full-time 25%      Part-time 75%

### Day Classes Vs Evening Classes

Day time 90%      Evening time 10%

- D. Faculty Expertise/Experience
  1. Northampton hires faculty members who are well-credentialed (see [Appendix J](#)) and understand and embrace the open-access mission of the community college.
  2. How do faculty in this program promote academic excellence through professional development, scholarship, and service?

The CAD instructors have been teaching for years, and they always attend professional development seminars as needed.

## IX. Analysis of Findings

- A. Based upon the data collected in this document, discuss the strengths and weaknesses of your program. *For example: do students' progress successfully through courses; are staffing/equipment/facilities needs filled; are assessment efforts successful; etc.*

The strength is that there is a high demand for students who have earned AAS in CAD from NCC.

The weakness is difficulty attracting new students seems to be our weakness because prospective students are attracted to low or no tech jobs with promises of sign-on bonus.

Based on the data collected in this document, discuss the opportunities for improvement available to your program and the internal and external challenges your program faces. *For example: is the program in demand; are graduates employable/able to transfer; what is the future plan for this program; etc.*

We regularly go to the area high schools to inform them about the downside of skipping college for the low or non-tech jobs that pay sign-on bonus. For example, they would be the first to be laid off once there is a downturn in the economy.

- B. What additional data that is currently not available would have been helpful to evaluate this program effectively? None

## X. External Review Report

Refer to [Appendix K](#) for the external/accreditor review report.

## XI. Action Plan

- A. Identify 2-3 program goals for the future.

1. Goal: To encourage underrepresented group to pursue career in CAD at NCC
  - i. Timeframe – 2023-2024 Academic Year
  - ii. Responsible Party(ies): the Program Manager for CAD-CAM Technologies and the NCC Recruiting Department
2. Goal: To encourage more students in the area Career and Technical Education centers to take advantage of the Articulation Agreements that make it possible to transfer at least 9 (nine) college CAD credits to NCC.

We are currently in talk with Boys and Girls Club of Bethlehem and Lynfield Community Center of Easton to encourage their high school age students to participate in the annual NCC Horizon Youth Camp for CAD Timeframe – 2023-2024 Academic Year

- i. Responsible Party(ies): the Program Manager for CAD-CAM Technologies and the NCC Admissions Office.



## Appendix A: Program Description

Northampton Community College's Computer Aided Design degree opens the door to countless career options as a designer, technician, illustrator, and more. This 2-year program teaches students about the growing field of computer-aided design and drafting (CADD) concepts and is great for people who like to design, develop, and help make existing products even better. With both CAD and CADD classes, you'll learn how to create mechanical designs for product parts, assemblies, and system configurations.

At NCC, you will gain exceptional hands-on experience that will prepare you for the professional world and teach you the necessary skills to gain an entry-level position. Our curriculum covers theoretical topics such as algebra and trigonometry, as well as practical matters such as engineering graphics and electrical fundamentals.

Northampton Community College provides the tools needed for career success by offering a curriculum that utilizes the latest software and technology including digital manufacturing and 3D Printing. Students are guided through problem-solving activities and design projects that promote individual and team effort, as well as creativity. Graduates study key skills that lead to successful careers in CAD, including work breakdown structure (WBS), presentation best practices, and how to work both independently and as a team.

Our computer design program has a small professor-to-student ratio, which allows you to build relationships and experience a more personal touch in our interactive classes. Students take courses such as Engineering Graphics, Manufacturing Processes, and Parametric Modeling, and also participate in design projects.

## Appendix B: Program-Level Learning Outcomes



- Demonstrate an ability to work independently and apply interpersonal and technical skills to solve problems.
- Exhibit proficient 2D drafting, 3D modeling, and computer skills in using several current industry standard CAD software such as but not limited to AutoCAD, Inventor and/or Solidworks to create mechanical designs for product parts, assemblies and models, applying appropriate drafting standards, dimensioning and tolerancing for same.
- Applies 3D parametric modeling techniques to create a digital prototype of the project and use rapid prototyping or similar technology to create a physical prototype of the design.
- Utilize analysis tools included in the CAD software perform simple analysis of parts, and dynamic motion analysis of assemblies to detect interferences of assembled parts.
- Exhibits competent technical vocabulary, graphical techniques and knowledge applicable to a variety of engineering disciplines, including mechanical, electronics, architectural, civil and others.
- Competently uses verbal and written presentation skills utilizing appropriate presentation tools (model, sketches, drawings, visual aids, etc.,) to convey design concept, product features, problems encountered and resolved, and features of a design.
- Understanding of the basic design process, work breakdown structure (WBS), time management, project scheduling, analyzing and researching data in an acceptable and standardized manner as it relates to Engineering Design.

## Appendix C: Program-Level Performance Indicator Data



Year	Total Students <sup>a</sup>	Withdrew <sup>b</sup>	Withdrew and transferred <sup>c</sup>	Retained in new major <sup>d</sup>	Retained in same major <sup>e</sup>	Graduated <sup>f</sup>	Graduated and Transferred <sup>g</sup>	% retention <sup>h</sup>
<b>2022</b>	25	DNA	DNA	DNA	DNA	DNA	DNA	DNA
<b>2021</b>	28	DNA	DNA	DNA	DNA	DNA	DNA	DNA
<b>2020</b>	25	DNA	DNA	DNA	DNA	6	1	DNA
<b>2019</b>	39	DNA	DNA	DNA	DNA	6	1	DNA
<b>2018</b>	40					5	0	DNA

- a. Enrollment as of Fall census date
- b. Withdrew prior to following year census
- c. Withdrew and transferred prior to following year census
- d. Stayed at NCC but was in a different major the following year census
- e. Stayed at NCC and was still in the same major the following year census (these students will be part of the following year total enrollment number)
- f. Graduated prior to following year census
- g. Graduated and transferred to another institution prior to following year census
- h. Percent of total students either graduated or still at NCC

**DNA = Data Not Available**

**Computer Aided Design Degree**

**Graduate Survey Results**

<i>Number of Graduates</i>	<i>Continuing Education</i>	<i>Employed</i>	<i>Job Hunting</i>	<i>Not Seeking Employment</i>	<i>Moved</i>	<i>No Report</i>
5	0 0%	3 60%	2 40%	0 0%	0 0%	0

**Of the Total Number of Graduates Employed:**

<i>Employed Related</i>		<i>Employed Unrelated</i>		<i>Employed Unrelated by Choice</i>	
3	100%	0	0%	0	0%

**Employers of Graduates**

ABEC, Inc.  
Asgco Manufacturing, Inc.  
Phoenix Hotform Company

**Positions Secured**

CAD Technician  
Electrical Designer  
Mechanical Designer

**Summary of Hourly Starting Salaries**

<i>Number Reporting Salary</i>	<i>2018 Lowest Salary</i>	<i>2018 Highest Salary</i>	<i>2018 Mean Salary</i>	<i>2018 Median Salary</i>	<i>Previous Year Median Salary</i>	<i>Median Percent Change</i>
3	\$15.00	\$21.63	\$18.88	\$20.00		

**Class of 2018**

**Computer Aided Design Degree**

**Graduate Survey Results**

<i>Number of Graduates</i>	<i>Continuing Education</i>	<i>Employed</i>	<i>Job Hunting</i>	<i>Not Seeking Employment</i>	<i>Moved</i>	<i>No Report</i>
6	1 20%	3 60%	1 20%	0 0%	0 0%	1

**Of the Total Number of Graduates Employed:**

<i>Employed Related</i>		<i>Employed Unrelated</i>		<i>Employed Unrelated by Choice</i>	
2	67%	1	33%	0	0%

**Employers of Graduates**

Crayola  
Scherer Design Group, LLC

**Positions Secured**

MRO Coordinator  
Wireless Designer

**Summary of Hourly Starting Salaries**

<i>Number Reporting Salary</i>	<i>2020 Lowest Salary</i>	<i>2020 Highest Salary</i>	<i>2020 Mean Salary</i>	<i>2020 Median Salary</i>	<i>Previous Year Median Salary</i>	<i>Median Percent Change</i>
0					\$15.62	

**Institutions To Which Graduates Transferred**

Southern New Hampshire University

**Class of 2019**

**Computer Aided Design Degree**

**Graduate Survey Results**

<i>Number of Graduates</i>	<i>Continuing Education</i>	<i>Employed</i>	<i>Job Hunting</i>	<i>Not Seeking Employment</i>	<i>Moved</i>	<i>No Report</i>
6	1 20%	3 60%	1 20%	0 0%	0 0%	1

**Of the Total Number of Graduates Employed:**

<i>Employed Related</i>		<i>Employed Unrelated</i>		<i>Employed Unrelated by Choice</i>	
2	67%	1	33%	0	0%

**Employers of Graduates**

Crayola  
Scherer Design Group, LLC

**Positions Secured**

MRO Coordinator  
Wireless Designer

**Summary of Hourly Starting Salaries**

<i>Number Reporting Salary</i>	<i>2020 Lowest Salary</i>	<i>2020 Highest Salary</i>	<i>2020 Mean Salary</i>	<i>2020 Median Salary</i>	<i>Previous Year Median Salary</i>	<i>Median Percent Change</i>
0					\$15.62	

**Institutions To Which Graduates Transferred**

Southern New Hampshire University

**Class of 2020**

# Appendix D: Advisory Committee Minutes



## Computer Aided Design (CAD) Program Advisory Committee Minutes

Thursday, May 11<sup>th</sup>, 2023 – 6:00pm-730pm

### In Attendance:

#### NCC Staff

Denise François François-Seeney – Dean, School of Business and Industry

Ken Nasatka – Director, Automotive, Industry and Manufacturing

Reginald (Reggie) Akpom – CAD Program Manager

Darlene Tice – Secretary

#### Companies

Christopher Rehrig – ABEC - Manufacturing Design Engineer

Jim Reinhart – D’Huy Engineering Inc, Senior CAD Technician

Alvaro Vega, D’Huy Engineering Inc, CAD Operator

Christopher Ruben – Lehigh Carbon Technical Institute - Engineering Drafting and Design Instructor

Brandon Vinyard – CTI – CAD Instructor Monroe County

\*\*\*\*\*

At 6:05pm, Ken Nasatka started the CAD Advisory Committee Meeting introductions. He talked about the different programs we have here under the Automotive, Industry and Manufacturing Dept. Denise François François introduced herself. Denise François spoke to the advisory board committee about needing their input and expertise on what we need be putting out into our students for what you want and need. Let them know they are here for their industry experience. Thanked the committee for being here and taking the time to be here.

#### Introductions of the Committee:

Alvaro Vega, was an NCC student last year (2022) with Reggie Akpom (CAD) and was hired by D’Huy Engineering as a draftsman and CAD Coordinator.

Christopher Ruben – Instructor; Engineering Drafting and Design - LCTI

Jim Reinhart, D’Huy Engineering, Senior CAD Operator for 6 yrs. In the field for 38 yrs. He is an alum from NCC in the Architecture Technology Program. Looks forward to giving back some good input to my alma mater.

Christopher Rehrig, has been with ABEC 18 yrs., Mechanical Designer then Design Team Leader to Design Team Manager. 23 yrs. of experience since graduating from Penn Tech College.

Brandon Vinyard – CAD Instructor Monroe County CTI. He started in Interior Design/Architecture Infrastructure in the city of New York. He does have experience in Revit.

Reggie spoke about taking the committee on CAD Lab tour. Before the tour, Ken spoke about appreciating everyone being here. We want to have a two-way conversation on what skills we are doing in the CAD Program. Do the students have the skills to get a job? If not, what can we approve on? We have articulation agreements with those skills, coming in from LCTI in the CAD take actually 9 credits. It actually reduces the number of hours and credits going through the program. We are looking at articulation agreements for students that are not in the CAD program but are looking into going into CAD at a later time. Students may not get 9 credits but can get 6 credits. We get state funding for a lot of the equipment we have. We do have up to date equipment. If you see something we can improve on with the equipment please let me know.

Reggie spoke (and showed CAD Program Map) about the overview and review of the curriculum: Program Maps, Stackable Degrees and New Courses/Technology that is planned. He said he will do whatever he can to help students get through the CAD Program. When students are hired by a company and need more training, they can come back to us and we can work something out to help the student succeed.

Ken said we will do whatever we can to do any special kind of training. CAD Lab here, we can work out a contract to use our CAD Lab for training. Can seat 20 people in the CAD Lab. We can gear it toward your company on what is needed. Instructor can actually request drawing gearing toward your company.

Jim Reinhart – asked about the CAD classes and the associate degree, are they taught only Mechanical fabrication type of drawings on this side of campus?

Ken mentioned we are trying to find what does industry needs out of there; we know they need Mechanical because a lot of the students are actually going. We do have an Architectural Program here at the college. Ken spoke about when he worked at Victaulic for 19 yrs. He did the Mechanical and Construction side. He was actually called Construction Type Services. He worked as a subcontractor. We know the mechanical gig is out there and architectural is here at the college. First 2 yrs. of a 5yr degree. The Construction Management is here at the college. Reggie is looking to add an Architectural course on our side. But not part of the Architectural Program. But the architectural students can take it. Already students are taking Revit. One of the other areas is Construction. We need to make an offering taking construction. We already have Construction Management Technology here. We were thinking of students coming here for the basic courses for the first two semesters, same basic course load. 3<sup>rd</sup> semester they would have to make a decision either mechanical or building. Do we pull courses from Construction Management into the CAD Program? Is that something of interest?

Jim Reinhart – He can see the dwindling numbers of CAD operators that do what we do and our department does because the student goes to NCC or a 4 yr. school. They get brainwashed. They have already skipped that whole design or drafting portion. It's been a progression. Had a conversation with our President of our company. The majority of people are in their 50's and there is nobody out there to replace them. No employees out there to take over. The Architecture Program at NCC use to give you the students. Jim feels that 4yrs – bachelor program, first two years use as an entry level.

Ken asked Jim, you are looking for architectural drafting than you are architecture and Jim said yes. Jim's company has many engineers and construction managers.

Jim Reinhart said you have a strong AutoCAD and not a strong Architectural program.

IF there is a need there is nothing that we cannot try to do Architectural. Can it be a separate degree, we can work on that.

Al Vega – As a student and working – what path am I going – once I started looking at the program. I chose construction management. I am interested in AutoCAD and Revit. He feels if there is a software inclusion; maybe of Architecture, he would consider taking Architecture Technology.

Ken asked what software is being used. Jim Reinhart said he uses Autodesk products, AutoCAD, Civil 3D, Revit and Architecture

Brandon Vinyard – Architecture, it is basically how the classes are owned. They may use AutoCAD and Revit. Whatever the focus of the course is. Ex: For Interior Design – are focused on how they are applied to that industry.

Ken recommended setting up a meeting with Reggie and trying to find out what skill you are looking for and what we can do with that for our students

Brandon Vinyard spoke about BIM. Ken said we need to start integrating into our program. Brandon said it is the future. Ken said he is very familiar with BIM. How do we connect our Construction Management into BIM? Ken asked, "Do we get drone technology? Brandon said with BIM you can go into other areas.

Reggie- spoke about encouraging students from your company. He is developing a class.

Ken mentioned to the committee if anyone from your company/university would like to teach?

Denise François said to have students see a connection and go to companies to see what they do; to be able to visualize, we at least capture students, if we do not, we have no students, no program.

Chris Rehrig asked how many students there are in CAD, Denise François said 25 students and not graduating students.

Ken mentioned that's it is not just CAD its other programs here that are struggling as well.

Chris Rehrig spoke about going to a career fair, talked to students, only spoke with 2 or three students. Last year there was none. A lot of students drive to 4 yr. universities.

Denise François mentioned how we struggle with high schools – express the 4 yr. colleges and then they say NCC. It is like an afterthought. We say come to us and save on funds. All our courses transfer to many 4yr institutions. When you transfer as a junior and we have articulation agreements with these institutions. That seems to be lost in translation. We have dorms, international experiences, my doctorate is no different from Penn State. Nothing is different in teaching. Chris Rehrig agreed with Denise François.

Brandon Vinyard spoke about his 10 seniors and only one is going to a 4 yr. school. The rest of the students go locally. Suggestion to be more than vs the less than the universities that are far away. Let us compete with them Lets have those resources. He tries hard to motivate.

Denise François mentioned we have lots of scholarships, we cannot give them away. No one interested.

Ken said we struggle with enrollment. How do we increase enrollment? If a student does well, we have 100 percent job placement. Company hires them right away. Companies are hiring right from vo-tech. Ken spoke about how to reach out to middle schools. There are plans to have a discovery center at NCC



for middle schoolers and have a trainer for each of the programs. Let the students play around with the trainers as they do with their parents. Brandon spoke about 3D printers – students love them

Reggie – parents do not know much about NCC. We need to bring in the parents and students and present what the program is all about.

Al Vega and Brandon Vinyard agreed that Drones are being used for everything.

Reggie mentioned he is developing a course, to develop a new software

What are the skills needed from the employer to instruct students? How can you as an employer help the students?

Denise François recommended employers to help with knowledge learning. We cannot take it all on.

Reggie spoke about students going on interviews and does not want them to say they do not know the program.

In conclusion: Ken asked the committee if they would prefer an in-person meeting or zoom. Zooming was recommended as well as Hybrid.

Denise François thanked everyone. She was happy to see how the committee was very engaging and to let Reggie know of any new software and to always keep Reggie engaged.

The meeting concluded at 7:20pm. Reggie gave a tour of the CAD Lab for the Advisory Board Committee.

## Appendix E: Curriculum Matrix



**Step one:** List all of the program learning outcomes for the program of study in the first column. List the program courses across the top row. Then make "**I**" for a learning outcome that is introduced (*addressed for the first time*), "**R**" for a learning outcome that is reinforced (*addressed again, but not emphasized in a major way*), and/or "**M**" for a learning outcome that is emphasized (*addressed in a major way, emphasis toward mastery*) under each specific course.

*Please note: Not every course will address every program learning outcome.*

*I = Introduce; R = Reinforce; M = Emphasize Mastery*

Program Learning Outcome	CADM100	CADM115	CADM205	CADM210	CADM230	CADM240	CADM250	CADM250	CADM255
1. Demonstrate an ability to work independently	I	I	I,R	I,R	I,R	LR	M	M	M
2. Produce working drawings that meet ANSI standards.	I	I	I,R	I,R	I,R	LR	M	M	M
3. Analyze and present data in acceptable and standard manner	I	I	I,R	I,R	I,R	LR	M	M	M
4. Solve common design problems.	I	I	I,R	I,R	I,R	LR	M	M	M
5. Produce working drawings that meet ANSI standards.	I	I	I,R	I,R	I,R	LR	M	M	M
6. Demonstrate observational integrative and synthetic skills.	I	I	I,R	I,R	I,R	LR	M	M	M
7. Demonstrate proper use and care of the hardware.	I	I	I,R	I,R	I,R	LR	M	M	M

8. Apply philosophy and techniques of design integrity.	I	I	I,R	I,R	I,R	LR	M	M	M
9. Describe the key process elements and technology commonly found in the CAD environment.	I	I	I,R	I,R	I,R	LR	M	M	M
10. Demonstrate the skills needed to pass the CAD Certification Exam.	I	I	I,R	I,R	I,R	LR	M	M	M

## Appendix F: Key Abilities Program Matrix



The five Gen Ed Key Abilities help students navigate the world. In each class they take, they should expect to be challenged to develop and deepen their key abilities. After they graduate, these abilities will help them continue learning, adapt to change, and become citizens who can make wise choices and contribute to their communities.

### 1. **Communicate**

- *Students are able to share their ideas powerfully and clearly.*
  - *Uses appropriate, relevant, and compelling content and sources that illustrate knowledge and understanding of the topic.*
  - *Assignment is organized and understandable. Distinct intro, body, and conclusion, as appropriate for the discipline.*
  - *Language is clear and understandable. Executes assignment within conventions of a specific discipline, including source citation.*

### 2. **Analyze and Solve Problems**

- *Students are able see and solve the problems around them, using solid data to draw and communicate reasonable conclusions.*
  - *Identify and understand an issue, concept, or problem, any data needs, and constraints that have to be considered in order to analyze an issue or solve a problem. Students recognize multiple perspectives*
  - *Use various tools, representations, notation, etc. to help them organize data and see relationships or identify assumptions related to the issue, concept or problem*
  - *Evaluate any conclusions drawn, implications made, or plans for solving a problem, including evaluating any assumptions and any evidence gathered.*

### 3. **Use Technology**

- *Students are able to select and ethically use appropriate technology to create, communicate and discover.*
  - *Effectively select and use the appropriate technology applications or resources to accomplish specific goals.*
  - *Be an active and responsible participant in online communities.*
  - *Understand the legal and ethical facets of technology in a global society.*

### 4. **Understand Diversity**

- *Students are able to understand how each individual's experiences shape our society, and how societies, in turn, shape the way local and global resources are used.*
  - *Explain how the range of human differences shape the historical and current formation of artistic, economic, social, scientific, cultural or political institutions*
  - *Explain how individuals experience equality and inequality with a society, its institutions or its cultures*
  - *Analyze how individuals and institutions have addressed persistent global challenges, including physical resources and social values.*

### 5. **Engage in Ethical Questions**

- *Students are able to identify ethical choices, consider alternatives and consequences, and choose actions and choose actions keeping in mind everyone affected.*

Indicate in the table below the program courses in which a key ability is assessed ("A"- Assessed) – if possible, identify the specific assignment/activity in which the key ability is assessed. Focus on the required courses and designated program electives.

Program Learning Outcome	CADM 100	CADM 115	CADM 205	CADM 210	CADM 230	CADM 240	CADM 250	CADM 250	CADM 255
<b>Communicate</b> : Students will be able to share ideas powerfully and clearly.	RM	RM	RM	RM	RM	RM	RM	RM	RM
<b>Analyze and solve problems:</b> Students will be able to see and solve around them using solid data to draw and communicate reasonable conclusions.	A	A	A	A	A	A	A	A	A
<b>Understand Diversity:</b> Students will be able to understand how each individual's experiences shape the way local and global recourses are used.	A	A	A	A	A	A	A	A	A
<b>Engage in Ethical Questions:</b> Students will be able to identify choices, consider alternative consequences	A	A	A	A	A	A	A	A	A

and choose actions keeping in mind that everyone is affected.

**Use Technology**  
Students will be able to select and ethically use appropriate technology to create, communicate, and discover.

A	A	A	A	A	A	A	A	A	A

Move the above chart to Appendix F where noted

**Step three:** Develop an assessment plan for Program Learning Outcomes and General Education/Key Abilities Outcomes. All program learning outcomes must be assessed and documented within a span of 5 years. General Education/Key Abilities Outcomes must be assessed annually – following NCC schedule. Remove

# Appendix G: Program Map



## Computer Aided Design- Associate in Applied Science (2022-2023 Catalog)

SEMESTER-BY-SEMESTER PROGRAM MAP FOR FULL-TIME STUDENTS

Courses are listed in preferred order of completion  
Plans can be modified to fit student needs by adding more semesters

Choose your courses with your Advisor.

Developmental Education Courses (if required)			
<input type="checkbox"/>	ACLS050	Introduction to Academic Literacy	<input type="checkbox"/> MATH020 Pre-Algebra
<input type="checkbox"/>	ENGL027	Writing Skills Workshop	<input type="checkbox"/> MATH022 Elementary Algebra
<input type="checkbox"/>			<input type="checkbox"/> MATH026 Intermediate Algebra

complete	Course #	Course Title	Credits	Gen Ed	Pre-requisites / Co-requisites	
Semester 1	<input type="checkbox"/>	COLS101	College Success	1		
	<input type="checkbox"/>	ENGL101	English I	3	Comm	PRE: ENGL Placement Policy
	<input type="checkbox"/>	CISC101	Introduction to Information Technology	3	CL	
	<input type="checkbox"/>	CADM100	Engineering Graphics Essentials	3		
	<input type="checkbox"/>	CADM115	Computer Aided Design I	3		PRE or CO: CADM100
	<input type="checkbox"/>	MATH140	College Algebra	3	QL	PRE: MATH Placement Policy
		Total Semester Credits:	16			
Semester 2	<input type="checkbox"/>	CADM205	Computer Aided Design II	3		PRE: CADM115
	<input type="checkbox"/>	CADM230	Parametric Modeling-Inventor I	3		PRE or CO: CADM205
	<input type="checkbox"/>	CMTH102	Introduction to Communication	3	Comm	
	<input type="checkbox"/>	CADM125	Manufacturing Processes	3		
	<input type="checkbox"/>	ENGL151T	English II (Technical Writing)	3	Comm	PRE: ENGL101
		Total Semester Credits:	15			
Semester 3	<input type="checkbox"/>	CADM210	Computer Aided Design III	3		PRE: CADM205
	<input type="checkbox"/>	CADM220	Parametric Modeling-SOLIDWORKS I	3		PRE: CADM205
	<input type="checkbox"/>	CADM240	Digital Manufacturing I	3		PRE: CADM230 and CO: CADM220
	<input type="checkbox"/>	MATH145	Trigonometry	3	QL	PRE: MATH140 w/C or better or math placement
	<input type="checkbox"/>	PHYS101	Physics I	4	Science	PRE: MATH140 w/C or better or math placement
		Total Semester Credits:	16			
Semester 4	<input type="checkbox"/>	CADM250	Design Project	3		PRE: CADM220, CADM230, and ENGL151
	<input type="checkbox"/>	CADM255	Statics & Strength of Materials (Algebra Based)	4		PRE: PHYS101
	<input type="checkbox"/>		AH or SIT General Education Elective	3		Depends on course selected
	<input type="checkbox"/>		SSHB General Education Elective	3		Depends on course selected
	<input type="checkbox"/>		Elective*	3		Depends on course selected
		Total Semester Credits:	16			
		Total Degree Credits	63			

General Education Requirements		
<input type="checkbox"/>		Diversity
<input type="checkbox"/>		Writing Intensive

**Notes:**

\*The CADM 260 - CAD Practicum can satisfy the Elective requirement.

\*It is the student's responsibility to be knowledgeable of NCC graduation requirements and to verify transfer requirements with the 4-year institution. Courses listed on the program map are based upon the assumption that prerequisites and courses taken in previous semesters will be successfully completed


 **Computer Aided Design, Certificate (2022-2023 Catalog)**

Developmental Education Courses (if required)		<input type="checkbox"/>	MATH020	Pre-Algebra	
<input type="checkbox"/>	ACLS050	Introduction to Academic Literacy	<input type="checkbox"/>	MATH022	Elementary Algebra
<input type="checkbox"/>	ENGL027	Writing Skills Workshop	<input type="checkbox"/>	MATH026	Intermediate Algebra

SEMESTER-BY-SEMESTER PROGRAM MAP FOR FULL-TIME STUDENTS  
 Courses are listed in preferred order of completion  
 Plans can be modified to fit student needs by adding more semesters  
 Choose your courses with your Advisor.

complete	Course #	Course Title	Credits	Gen Ed	Pre-requisites / Co-requisites	
Semester 1	<input type="checkbox"/>	COLS101	College Success	1		
	<input type="checkbox"/>	CISC101	Introduction to Information Technology	3	CL	
	<input type="checkbox"/>	CADM100	Engineering Graphic Essentials	3		
	<input type="checkbox"/>	ENGL101	English I	3	Comm	PRE: English Placement Policy
	<input type="checkbox"/>	CADM115	Computer Aided Design I	3		
	<input type="checkbox"/>	MATH140	College Algebra	3	QL	PRE: Mathematics Placement Policy
			Total Semester Credits:	16		
Semester 2	<input type="checkbox"/>	CADM125	Manufacturing Processes	3		
	<input type="checkbox"/>	CADM205	Computer Aided Design II	3		PRE: CADM115
	<input type="checkbox"/>	CADM230	Parametric Modeling-Inventor I	3		PRE or CO: CADM205
	<input type="checkbox"/>	ENGL151T	English II (Technica Option)	3	Comm	PRE: ENGL101
	<input type="checkbox"/>	CMTH102	Introduction to Communication	3	Comm	
			Total Semester Credits:	15		
Semester 3	<input type="checkbox"/>	CADM210	Computer Aided Design III	3		PRE: CADM205
	<input type="checkbox"/>	CADM220	Parametric Modeling-SOLIDWORKS I	3		PRE: CADM205
	<input type="checkbox"/>	CADM240	Digital Manufacturing I	3		PRE: CADM220
	<input type="checkbox"/>	MATH145	Trigonometry	3	QL	PRE: MATH140 or Math Placement Policy
			Total Semester Credits:	12		
			Total Degree Credits	43		

\*It is the student's responsibility to be knowledgeable of NCC graduation requirements and to verify transfer requirements with the 4-year institution. Courses listed on the program map are based upon the assumption that prerequisites and courses taken in previous semesters will be successfully completed

 **Computer Aided Drafting Fundamentals, Specialized Diploma (2022-2023 Catalog)**

Developmental Education Courses (if required)		<input type="checkbox"/>	MATH020	Pre-Algebra	
<input type="checkbox"/>	ACLS050	Introduction to Academic Literacy	<input type="checkbox"/>	MATH022	Elementary Algebra
<input type="checkbox"/>	ENGL027	Writing Skills Workshop	<input type="checkbox"/>	MATH026	Intermediate Algebra

SEMESTER-BY-SEMESTER PROGRAM MAP FOR FULL-TIME STUDENTS  
 Courses are listed in preferred order of completion  
 Plans can be modified to fit student needs by adding more semesters  
 Choose your courses with your Advisor.

complete	Course #	Course Title	Credits	Gen Ed	Pre-requisites / Co-requisites	
Semester 1	<input type="checkbox"/>	COLS101	College Success	1		
	<input type="checkbox"/>	CISC101	Introduction to Information Technology	3	CL	
	<input type="checkbox"/>	CADM100	Engineering Graphic Essentials	3		
	<input type="checkbox"/>	ENGL101	English I	3	Comm	PRE: English Placement Policy
	<input type="checkbox"/>	CADM115	Computer Aided Design I	3		
	<input type="checkbox"/>	MATH120	Nature of Mathematics*	3	QL	PRE: Mathematics placement policy
			Total Semester Credits:	16		
Semester 2	<input type="checkbox"/>	CADM125	Manufacturing Process	3		
	<input type="checkbox"/>	CADM205	Computer Aided Design II	3		PRE: CADM115
	<input type="checkbox"/>	CADM230	Parametric Modeling-Inventor I	3		PRE or CO: CADM205
	<input type="checkbox"/>	ENGL151T	English II	3	Comm	PRE: ENGL101
	<input type="checkbox"/>	CMTH102	Introduction to Communication	3	Comm	
			Total Semester Credits:	15		
			Total Degree Credits	31		

**Notes:**

\*If student is going to continue on to earn the Certificate or Associate in Applied Science, it is recommended to complete MATH140 instead of MATH120.

\*It is the student's responsibility to be knowledgeable of NCC graduation requirements and to verify transfer requirements with the 4-year institution. Courses listed on the program map are based upon the assumption that prerequisites and courses taken in previous semesters will be successfully completed



# Appendix H: Co-curricular Map



	0 - 15 credits	16 - 30 credits	31 - 45 credits	46+ credits
<b>Get the Courses You Need</b>	Take the following courses: COLS 101 College Success (3) CISC 101 Introduction to Computers (3) CADM 100 Engineering Graphics Essentials (3) CADM 115 Computer Aided Design I (3) ENGL 101 English I (3) MATH 140 College Algebra (3)  16 Credits	Take the following courses: ENGG 125 Manufacturing Processes (3) CADM 205 Computer Aided Design II (3) CADM 230 Parametric Modeling – Inventor I (3) ENGL 151T English II (Technical Writing) (3) CMTH 102 Speech Communication (3)  15 Credits	Take the following courses: CADM 210 Computer Aided Design III (3) CADM 220 Parametric Modeling – SOLIDWORKS I (3) CADM 240 Digital Manufacturing I (3) PHYS 101 Physics I (4) MATH 145 Trigonometry (3)  16 Credits	Take the following courses: CADM 250 Design Project (3) CADM 255 Statics and Strength of Materials (3) Gen Education Elective (AH or SIT) (3) Gen Education Elective (SSHB) (3) Elective (3)  15 Credits
	<i>For details on course requirements, see the Program Map.</i>			
<b>Engage with the Spartan Experience</b>	<ul style="list-style-type: none"> <li>- Attend at least one campus recreation event</li> <li>- Attend Guest Speakers</li> <li>- Join student club(s)</li> <li>- Review academic plan</li> <li>- Seek out community service/ service learning opportunities</li> </ul>	<ul style="list-style-type: none"> <li>- Attend Guest Speakers</li> <li>- Discuss elective/gen ed options</li> <li>- Explore internships via Career Services</li> <li>- Seek out community service/ service learning opportunities</li> <li>- Tour Fowler/Fab Lab</li> </ul>	<ul style="list-style-type: none"> <li>- Attend Guest Speakers</li> <li>- Mentor new students</li> <li>- Research Center for Innovation &amp; Entrepreneurship</li> <li>- Seek out community service/ service learning opportunities</li> </ul>	<ul style="list-style-type: none"> <li>- Apply for student awards</li> <li>- Attend Guest Speakers</li> <li>- Mentor new students</li> <li>- Seek out community service/ service learning opportunities</li> </ul>
<b>Get Ready for Life after Completion – Career Readiness</b>	<ul style="list-style-type: none"> <li>- Attend Career Service Sessions</li> <li>- Attend on-campus Career Fairs – Fall &amp; Spring semesters at both Bethlehem &amp; Monroe campuses</li> <li>- Complete the career readiness GPS to help select a potential Business major</li> </ul>	<ul style="list-style-type: none"> <li>- Attend on-campus Career Fairs – Fall &amp; Spring semesters at both Bethlehem &amp; Monroe campuses</li> <li>- Attend sponsored company tours</li> <li>- Complete stackable credentials</li> </ul>	<ul style="list-style-type: none"> <li>- Arrange job shadowing experience</li> <li>- Attend on-campus Career Fairs – Fall &amp; Spring semesters at both Bethlehem &amp; Monroe campuses</li> <li>- Complete stackable credentials</li> <li>- Explore Internships, externships – list potential experiences</li> <li>- Explore job shadowing experience – list potential employers</li> <li>- Research practicum sponsors (list potential employers)</li> <li>- Resume Development</li> <li>- Social media creation or update</li> </ul>	<ul style="list-style-type: none"> <li>- Apply for FT jobs</li> <li>- Apply for graduation</li> <li>- Attend on-campus Career Fairs – Fall &amp; Spring semesters at both Bethlehem &amp; Monroe campuses</li> <li>- Complete stackable credentials</li> <li>- Review and take certification testing</li> </ul>
<b>Get Ready for Life after Completion – Transfer Readiness</b>	<ul style="list-style-type: none"> <li>- Identify transfer colleges/universities – list transfer articulation agreements or other transfer opportunities</li> </ul>	<ul style="list-style-type: none"> <li>- Contact Transfer Advisor to gain knowledge of application process</li> <li>- Create list of potential transfer schools</li> </ul>	<ul style="list-style-type: none"> <li>- Attend college fairs/visits</li> <li>- View list of articulation agreements</li> <li>- Choose your transfer institution and gather application materials</li> <li>- Ask a professor(s) for an “excellent” reference</li> </ul>	<ul style="list-style-type: none"> <li>- Apply for graduation</li> <li>- Apply for transfer to a college or university at the beginning of the semester.</li> </ul>

# Appendix I: Assessment Plan



## NCC's General Education Assessment Schedule

Outcome Assessed	Fall 2020	Spring 2021	Fall 2021	Spring 2022	Fall 2022	Spring 2023	Fall 2023	Spring 2024	MSCHE Visit	
									Fall 2024	Spring 2025
Diversity Outcome	Evaluate & Plan	Assess	Analyze & Document	Showcase		Evaluate & Plan	Assess	Analyze & Document	Showcase	
Ethical Qs Outcome		Evaluate & Plan	Assess	Analyze & Document	Showcase		Evaluate & Plan	Assess	Analyze & Document	Showcase
Communicate Outcome			Evaluate & Plan	Assess	Analyze & Document	Showcase		Evaluate & Plan	Assess	
Analyze/Solve Problems Outcome				Evaluate & Plan	Assess	Analyze & Document	Showcase		Evaluate & Plan	Assess
Technology Outcome					Evaluate & Plan	Assess	Analyze & Document	Showcase		Evaluate & Plan

	Program Learning Outcomes (PLOs) (list the PLO # and the corresponding course # where PLO will be assessed)	Gen Ed / Key Ability Outcomes (list the Gen Ed Outcome and the corresponding course # where it will be assessed)
AY 2021-2022	1 and 2 – Standardized Practice Certification test for AutoCAD	Communicate
AY 2022-2023	3 and 4 – Standardized Practice Certification test for Inventor	Analyze & Solve Problems, Technology
AY 2023- 2024	5 and 6 – Standardized Practice Certification test for SolidWorks	Diversity, Ethical Q
AY 2024-2025	7 – Standardized Practice Certification test for Revit (Residential Building) Design	Communicate, Analyze & Solve Problem

## Appendix J: Teaching Faculty Credentials



Phil Attanasio: Self Employed. Freelance consultant in the field of Architectural Drafting Worked as a consultant with Architects. Design and construction documents. Major clients included JPV, New York, New York.

Lou Massanova  
Owner LM Consulting Group  
Easton. PA

Anthony J. Cuvo  
Principal Engineer – Materials Technology  
Easton. PA

## Appendix K: External Review Report



NCC Computer Aided Design Program Audit  
Robert J Reid Jr  
March 26, 2023

### Major Recommendations:

The Computer Aided Design Curriculum provides a well-balanced program for students wanting to learn CAD. Balance is Key! It allows the opportunity for students to learn skills needed to get a successful start in the mechanical design field. The introduction of other various design software is also key for students wanting to learn not just mechanical, but other design disciplines. The balance of what they are learning and what they will apply once in industry. The inclusion of advanced manufacturing techniques further increases the value of the program to students and their future employers.

### Overall recommendations:

- Continue including 2D AutoCAD and both Inventor and SolidWorks in the curriculum. This provides a well-rounded base for future mechanical product and industrial equipment design employment. AutoCAD 2D is also essential in learning CAD.
- Improve value to students by changing the focus of later AutoCAD centered courses from 3D solid modeling techniques to introducing CAD drafting and design examples from other disciplines. Candidates include mechanical systems, such as Process Piping and HVAC, Architectural drafting and Civil Engineering design, and Fusion.
- A brief overview of standard drafting practices is a must. Students must learn. Basic drafting standards from days when all drafting was done on the “board.”
- Certification exams should be taken by all students enrolled in the 2 year CAD Program.

Robert J Reid Jr  
1183 Dewalt Drive  
Easton, PA 18040

March 26, 2023

Denise François-Seeney, Ph.D.  
Dean, Business and Technology  
Northampton Community College  
3835 Green Pond Road  
Bethlehem, PA 18020

Dear Dean François-Seeney,

Ken Nasatka, Director, Automotive, Industry & Manufacturing, has reached out to me in regards to conducting an audit for the Computer Aided Design (CADM) A.A.S. Degree Program currently being offered at Northampton Community College. My background for doing this audit is being an Adjunct Professor for several years at NACC, and also my 25+ years of working with various CAD programs in industry. Over 40 years in the mechanical design field. My current position is Senior Designer for Follett Products LLC in Easton Pa. Follett is a 75 year old company that manufactures Ice and Water dispensers.

I have reviewed the 2023 CAD A.A.S. Degree Program. Key points in this audit include:

- The Different CAD courses that are being made available to the students for the various types of CAD Disciplines found in industry, (i.e., Mechanical, Civil, and Architectural).
- Key Courses such as Engineering Design (ENGG) Help ease the transition from learning to applying what they have learned in industry.
- The three main software packages used for mechanical design in the Lehigh Valley region: AutoCAD, SolidWorks and Inventor. AutoCAD and Inventor being Autodesk Products. Autodesk products include the Civil, and Architectural portions.
- The course work that is currently being offered to the students will prepare them for taking certification exams offered by third-party testing organizations for these main software packages. These exams will allow the students to show potential employers their specific proficiency with these tools in addition to their academic credentials.
- The computer hardware and software available to the students meet at least the minimum requirements from each of the different software supplied. Classroom video displays have been upgraded to the equivalent level.
- Class sizes are typically running between 30% and 50% room capacity. This level allows for the current steady, moderate growth in enrollment over the next several years.
- Coursework is included in the program to introduce current and emerging manufacturing technologies. Equipment available for instruction in these technologies is on par with that found in local industries.

## Recommendations for consideration:

- Keep the current curriculum focusing on the Mechanical Design application of AutoCAD, Inventor, and SolidWorks. This software is also heavily utilized in other industries, including Architecture, Civil Engineering and Mechanical Systems, Piping Systems. An introduction to drafting conventions used in these industries must be included.
- Course coverage should be included to familiarize students with the drafting conventions used by different disciplines beyond mechanical part and equipment design. These disciplines could be Architectural Drafting, Process Piping and Civil Engineering. AutoCAD is used heavily in these industries and this experience would increase the student's job prospects. The introduction of Autodesk Fusion would need to be covered within the curriculum. This is the next step for Autodesk after Inventor Software. "Where Autodesk is Going"
- Course coverage should be included for working with point cloud data. This type of data is becoming less expensive to generate and CAD tools are becoming readily available to leverage this data. This is heavily utilized in the Civil Engineering field.
- CAD students should be working in-hand with the Machine Shop and Welding Department to better understand Manufacturing Processes and how-to document.
- Consider the introduction to AutoCAD Electrical.

In conclusion, I find that the Computer Aided Design program at Northampton Area Community College provides a strong, beginning, and the "cornerstone" for all students looking to choose their career path in CAD. NACC provides them with the knowledge they learn both how it was "done on the board" up to and including "3D Parametric Modelling."

Sincerely,



Robert J Reid Jr