



**Navajo Technical University**

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**Course Title: CNC Computer Numerical Control**  
**Course #: AMT 280 -1**

**Credit Hours:3**  
**Semester: Spring 2022**  
**Cap:20**

**Faculty:** Dr. RAGAVANANATHAM SHANMUGAM

**E-mail:** rags@navajotech.edu

**Office:** TECH 323

**Office Phone:**

**Office Hours** (face-to-face / online)

**Preferred Communication** (email and/or text; will respond within 24 hours)

**Class Location:** E CLRM

**Class Meeting Times:** EVERY TUESDAY & THURSDAY 11 AM TO 12.20 PM. (ONLINE)

**Required Materials:**

**Textbooks:**

Study material provided by Tooling –U is exhaustive. But interested students may use the following books for further reference.

(1) Kalpakjian. S, “Manufacturing Engineering and Technology”, Pearson Education India Edition,2009.

(2) Roy. A. Lindberg, Processes and materials of manufacture, PHI / Pearson education, 2006.

**Tools:** Every Student is required to have a laptop with good internet connection and Access to Tooling-U software through book store@NTU

**Lab Fee (if applicable):** As applicable

**Mission Statement**

Navajo Technical University’s mission is to provide University readiness programs, certificates, associate, baccalaureate, and graduate degrees. Students, faculty, and staff will provide value to the Diné community through research, community engagement, service learning, and activities designed to foster cultural and environmental preservation and sustainable economic development. The University is committed to a high quality, student-oriented, hands-on-learning environment based on the Diné cultural principles: *Nitsáhákees, Nahátá, Íina, Siihasin.*

**Course Description**

This course introduces the CNC machine and its history, basics of CNC lathe, CNC mill, its specs, coordinates, basics of G code programming.it also provides introduction to CAD and CAM, control panel functions of CNC lathe and Mill, offsets and how to create CNC program for both Lathe and Mill. It also provides knowledge in identifying and demonstrating canned cycles for various machining operations.

**TOTAL: 45 Hrs**

| Course Outcomes  | Course Measurements  |
|--|--|
| Ability to understand the G code Programming   | Complete reading assignments, pretests (quizzes), final exams provided t the end of each module in Tooling –U, which will be considered as assignments, exams and projects if any. |
| Understand the operations and coordinates of CNC and lathe and Milling machines        |  |
| Apply the different types of Control panel functions for CNC Lathe and Mill            |  |
| Ability to create various CNC milling and turning programs                             |  |
| Ability to identify, understand and demonstrate the operation of various canned cycles |  |

### Course Activities

| Week | Date       | Chapters                                | Assignments & Quizzes | Remarks |
|------|------------|---|-----------------------|---------|
| 1    | 01/18/2022 | Introduction to CNC machines            | Due before next week  |         |
| 2    | 01/20/2022 | Introduction to CNC machines            |                       |         |
|      | 01/21/2022 | <b>Last day to add/drop</b>             |                       |         |
| 3    | 01/25/2022 | Basics of CNC lathe                     | “                     |         |
| 4    | 01/27/2022 | Basics of CNC lathe                     |                       |         |
| 5    | 02/01/2022 | Basics of CNC mill                      | “                     |         |
| 6    | 02/03/2022 | Basics of CNC mill                      |                       |         |
|      |            |   |                       |         |
| 7    | 02/08/2022 | Coordinates for CNC lathe               |                       |         |
| 8    | 02/10/2022 | Coordinates for CNC mill                | “                     |         |
| 9    | 02/15/2022 | Basics of G code Programming            |                       |         |
| 10   | 02/17/2022 | Basics of G code Programming            | “                     |         |
| 11   | 02/21/2022 | <b>Holiday</b>                          | “                     |         |
| 12   | 02/22/2022 | Basics of G code Programming            |                       |         |
| 13   | 02/24/2022 | Introduction to CAD & CAM for machining | “                     |         |
| 14   | 02/25/2022 | <b>Graduation Petition is due</b>       |                       |         |
|      |            | <b>Midterm Grades Due</b>               |                       |         |
| 15   | 03/01/2022 | Control panel functions for CNC lathe   | “                     |         |
| 16   | 03/03/2022 | Control panel functions for CNC lathe   |                       |         |
| 17   | 03/08/2022 | <b>Midterm</b>                          | “                     |         |
| 18   | 03/10/2022 | Offsets on the CNC lathe                |                       |         |
| 19   | 03/22/2022 | Offsets on the CNC mill                 |                       |         |
| 20   | 03/24/2022 | Creating a milling program              | “                     |         |

|    |                   |  |   |  |
|----|-------------------|--|---|--|
| 21 | 03/29/2022        | Creating a CNC turning program         | “ |  |
| 22 | 03/31/2022        | Creating a CNC milling program         |   |  |
|    |                   | <b>Last day to withdraw with a “W”</b> |   |  |
| 23 | 04/05/2022        | Calculations for programming the Lathe | “ |  |
| 24 | 04/07/2022        | Calculations for programming the mill  |   |  |
| 25 | 04/12/2022        |  |   |  |
| 26 | 04/14/2022        | Calculations for programming the mill  | “ |  |
| 27 | 04/19/2022        | Canned cycles for Lathe                | “ |  |
| 28 | 04/21/2022        | Canned cycles for Lathe                |   |  |
| 29 | 04/26/2022        | Canned cycles for mill                 | “ |  |
| 30 | 04/28/2022        | Canned cycles for mill                 |   |  |
| 31 | 05/03/2022        | <b>Review</b>                          |   |  |
| 32 | 05/05/2022        | <b>End Semester Exam</b>               |   |  |
| 33 | <b>05/10/2022</b> | <b>Grades are due to the Registrar</b> |   |  |
| 34 | <b>05/13/2022</b> | <b>Graduation</b>                      |   |  |

### Grading Plan

|                     |     |               |
|---------------------|-----|---------------|
| Assignments         | 40% | A = 100 - 90% |
| Mid-term            | 25% |               |
| End Sem             | 25% | B = 89 - 80%  |
| Quizzes             | 5%  | C = 79 - 70%  |
| Class Participation | 3%  | D = 69 - 60%  |
| Portfolio:          | 2%  | F < 60%       |

### Grading Policy

Each student must do his or her own assignments and case studies. Discussion among students on assignments and cases is encouraged for clarification of assignments, technical details of using software, and structuring major steps of solutions - especially on the course's Web site. Students must do their own work on the assignments and exam. Cheating and Plagiarism are strictly forbidden. Cheating includes but is not limited to: plagiarism, submission of work that is not the student's own, submission or use of falsified data, unauthorized access to exam or assignment, use of unauthorized material during an exam, supplying or communicating unauthorized information for an assignment or exam.

### Participation

Students are expected to attend and participate in all class activities- as listed above, as it is **3% of the grade**. Points will be given to students who actively participate in class activities including field trips, laboratories, and ask questions of guest speakers and other presenters. Those who attend all the classes without absent, only will be given 3% weightage.

### Cell phone and headphone use

Please turn cell phones off or place them on silence or vibrate mode **before** coming to class. Also, answer cell phones **outside of class** (not in the classroom). Exercising cell phone use courtesy is appreciated by both the instructor and classmates. Headphones are to be removed before coming to class.

### **Attendance Policy**

Students are expected to regularly attend all classes for which they are registered. A percentage of the student's grade will be based on class attendance and participation. Absence from class, regardless of the reason, does not relieve the student of his/her responsibility to complete all course work by the required deadlines. Furthermore, it is the student's responsibility to obtain notes, handouts, and any other information covered when absent from class and to arrange to make up any in-class assignments or tests if permitted by the instructor. Late, incomplete or missing assignments will necessarily affect the student's grades. Instructors will report excessive and/or unexplained absences to the Counseling Department for investigation and potential intervention. **Instructors may drop students from the class after three (3) absences unless prior arrangements are made with the instructor to make up work and the instructor deems any excuse acceptable.**

### **Study Time Outside of Class for Face-to-Face Courses**

**For every credit hour spent in a class, a student is expected to spend two hours (2) outside of class studying the course materials.**

### **Study Time for Hybrid or Blended Courses**

**For a hybrid or blended course of one (1) credit hour, a student is expected to spend three (3) hours per week studying the course materials.**

### **Study Time for Online Courses**

**For an online course of one (1) credit hour, a student is expected to spend four hours (4) per week studying the course materials.**

### **Academic Integrity**

Integrity (honesty) is expected of every student in all academic work. The guiding principle of academic integrity is that a student's submitted work must be the student's own. Students who engage in academic dishonesty diminish their education and bring discredit to the University community. Avoid situations likely to compromise academic integrity such as: cheating, facilitating academic dishonesty, and plagiarism; modifying academic work to obtain additional credit in the same class unless approved in advance by the instructor, failure to observe rules of academic integrity established by the instructor. **The use of another person's ideas or work claimed as your own without acknowledging the original source is known as plagiarism and is prohibited.**

### **Diné Philosophy of Education**

The Diné Philosophy of Education (DPE) is incorporated into every class for students to become aware of and to understand the significance of the four Diné philosophical elements, including its affiliation with the four directions, four sacred mountains, the four set of thought processes and so forth: Nitsáhákees, Nahát'á, Íina and Siih Hasin which are essential and relevant to self-identity, respect and wisdom to achieve career goals successfully.

### **Students with Disabilities**

The Navajo Technical University and **Dr. Ragavanantham Shanmugam, Assistant Professor, School of Engineering, Math and Technology** are committed to serving all enrolled students in a non-discriminatory and accommodating manner. Any student who feels he/she may need an accommodation based on the impact of disability or needs special accommodations should inform NTU in accordance with the procedures of the subsection entitled "Students with Disabilities" under Section 7: Student Support Programs, NTU Student Handbook.

**Final Exam Date: Will be announced Later**