New Course Proposal
North Rose-Wolcott Central Schools

Department/ Grade Level: High School Technology Department (grades 9-12)
Course Title: CNC & Laser Processing
Length: 1 Semester (½ year)
Credit: ½ Credit
Prerequisite: None
Enrollment: Any student in grades 9-12

Staff needed (special qualifications if applicable): No additional staff required, I am planning on using this course to replace Advanced Wood Tech. If approved, I would need time to write the curriculum and attend a 2 day training session on the software/equipment.

Course Description: Students will learn how to use a drawing program (V-Carve), to design a "project" which will be cut using a CNC (Computer Numerical Control) router. They will also have to convert their drawings into G-code which will be read by the CNC router. As part of the design process, they will have to identify the material being cut and determine the proper cutting speed and feed rate along an X, Y, and Z axis.

Along with this, each student will design a "project/layout" in a graphics program (Adobe Photoshop) and then engrave their design into a variety of materials (wood, acrylic, glass, ceramics, along with other materials). They will also utilize the laser to cut parts out of a variety of materials as well.

Materials or Special Equipment Needed:
• A Laser Engraver/Cutter (estimated cost: $25,000 – although this qualifies for aid @ 60-70%).
• Around $500-$750 for CNC router bits and materials.

Summary of Alignment to the NYS Learning Standards: ***Standard 5 – Technology***

1 Engineering Design
• PI –initiate and carry out a thorough investigation…

#2 Tools, Resources, and Technological Processes
• PI – use appropriate graphic and electronic tools and techniques to process information

#3 Computer Technology
• PI – use the computer as a tool for…

#5 History & Evolution of Technology
• PI – identify technological developments that have significantly accelerated human progress

Course Justification (new course or modification of existing course):
Years ago, our students could graduate with some basic machine/equipment skills and get a job in a manufacturing company. Unfortunately, this is no longer true. Multiple surveys have identified the need for skilled workers who can design using CAD/Graphic software and operate CNC/Laser equipment found in many of today's technologically advanced work places. This technology is used by virtually every advanced manufacturing company in the world today.

As part of the College & Career readiness initiative I feel it necessary to update our courses to provide our students with the skills and knowledge to be employable when they graduate from high school and enter into such an “advanced” workplace and/or attend a technical college.

Although many of our students come from dysfunctional or poverty–stricken homes, doesn’t mean they can’t learn or don’t have the desire to learn. By offering this course, I feel we can provide our “underprivileged” as well as our “traditional” students with a hands-on opportunity to learn CNC/Laser machining that would put them on an “even playing field” with other schools who are already offering this type of instruction. Thus, it will allow them to be competitive in a rapidly growing high tech industry.

This type of equipment would also provide the students with unique STEM experiences as it would require them to utilize science, technology, engineering, and math as they progress through the course. The following highlights on some of the skills required for each discipline:

Math:

- The students will be required to measure to the nearest .001 of an inch. They will also have to add/subtract measurements, and convert from fractions to decimal.

- Understand how to work and graph on an X – Y axis as this will determine the path of the cutter. Along with this, the Z axis will also be introduced as this will determine the depth of cut.

- Apply basic geometry to calculate angles.

- Identify what a vector is and how it relates to the tool path.

- Be able to scale an object/drawing and understand the concept of ratios.

- Be able to define the basic terminology of words such as: diameter, radius, bisect, arc, origin point, etc.

Science:

- The students will have to understand & compare the composition of the materials they are cutting and in some cases understand the process of how they are manufactured. Such as: wood, wood composites, metal (ferrous vs. non-ferrous), plastics, Corian, high density fiber board, etc.

Technology:

- Cutting speeds and feed rates for the material being processed. The following terminology will be taught: RPM, spindle speed, controller, gantry, axis, stepper motor, lead screw, etc.

- How to do a basic CAD drawing that will be converted into G code which will control the cutting path of the CNC router.

- How the profile of various cutters determine the shape of the cut.

- How to use a graphics program to edit or create a drawing that will be engraved into or cut through a variety of materials using a laser engraver.
- Set up and operate the CNC router/laser engraver to perform various cuts in different materials.
- Identify why industry uses CNC/laser machines for most of its production processes.

Proposed Start Date: January 2017
Submitting Teacher: Brian LaValley
Submission Date: October 23, 2015

Please submit to Building Administrator by **October 23rd** for review.

Next steps:
- Building Administrator submits proposal to the Director of Curriculum and Instruction by **November 2nd**.
- CSDC reviews proposal presentation by staff at **November**/**December CSDC meeting**.
- Superintendent recommends new course to BOE at **December BOE meeting**. Submitting teacher will be present at that meeting to give additional information as requested.
- Upon BOE approval, teacher will submit course outline/syllabus, including anticipated assessments used, **by May 1st.**
- Counseling Office will include the new course description in the Student Course Catalog.

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This proposal (will / will not) be recommended for approval.
If not recommended for approval, reason:

Teacher may resubmit amended proposal.

_____ Date: _____
(Signature of building administrator)