

Machine Tool Technology Department

MACH 51A Course Syllabus

Course Information

Course title: BEG MACHINE TOOL TECH

Course number: MACH 51A

Section number: 4363

Units: 2.0

Prerequisites: None

Recommended: Course Eligibility for ENGL 100 OR Course Eligibility for ENGL 100A OR Course Eligibility for ESL 100.

Classroom: Room 2330, located in Lounibos Hall

Class Hours: Thursday from 6 p.m. until 10 p.m. in room 2330

Course Description

Introduction to the theory and practices of machining processes. Includes use and care of the lathe, mill, drill press, and common hand tools, and the measurement and layout of metal for producing a machine part to print specifications. Also recommended for students in related vocational areas.

Instructor Information

Name: Rick Nelson

Office: 2330 Lounibos Hall

Office hours:

Thursday 5:15 p.m. to 6:00 p.m.

You may contact me in either Lounibos 2330 or 2309.

Office phone number: TBD (e-mail is best contact)

Email address: rnelson2@santarosa.edu

Textbook: *Precision Machining Technology 3rd ed.* by Peter Hoffman, Eric Hopewell
This is a requirement.

Materials fee: \$50.00 (included in your enrollment fees)

Materials Needed

1. Assigned text book.
2. Safety glasses (these will be supplied)
 - State approved (Z87.1)
 - Dark lenses and sunglasses are not allowed
3. A 6" Steel rule for measuring in 32nd, 64th, 50th, and 100th increments (supplied)

Materials Needed cont.

4. A three ring binder to organize your class materials
5. Pens and note paper for taking notes
6. Apron or shop coat (optional)

Outcomes and Objectives

Student Learning Outcomes:

Students will be able to:

1. Grind a tool bit into a right handed turning tool utilizing a pedestal grinder and a piece of high speed steel (H.S.S.)
2. Machine a center utilizing the tool bit that was previously made from H.S.S.
3. Mill a plate on a milling machine from a blueprint.

Objectives:

Upon completion of this course, students will be able to:

1. Trace the development of the history and methods of machine tool technology.
2. Identify and use common shop safety practices and equipment to prevent shop safety hazards.
3. Demonstrate knowledge of the theory of machining as applied to machine tool techniques.
4. Recognize and predict changes in the properties of metal when exposed to machine tool techniques.
5. Identify and describe applications of common mechanical hardware and hand tools found in the machine shop.
6. Read and interpret common detail drawings found in a machine shop.
7. Calculate and set appropriate angles for grinding a tool bit.
8. Describe set-up, operation, and safety procedures for the pedestal grinder.
9. Select the correct feeds and speeds for commonly used materials.
10. Describe the tools and methods of metrology/dimensional measurement.
11. Identify and describe the important components, controls, and functions of vertical and horizontal milling machines.
12. Compare and contrast three basic drill press types and explain their differences and primary uses.
13. Classify types of saws and describe their uses.
14. Calculate cutting speeds and feeds for a variety of machining processes.
15. Identify common methods of measurement conversions.
16. Identify the most important parts of the lathe, drill, and mill and describe the function of each relative to producing parts on manually operated machines.
17. Identify realistic career objectives in machine tool technology.

Topics and Scope

I. History of Machine Tooling

- A. Development of technologies
- B. Development of power sources

II. Machine Tool Theory

- A. Common manufacturing materials and processes
- B. Properties of metals

III. Shop Safety

- A. Practices
- B. Equipment

IV. Grinding

- A. Tool bit grinding procedures and clearances

Topics and Scope cont.

B. Calculating and setting angles

C. Pedestal grinder

1. care
2. safety
3. set-up
4. use

V. Lathes/Turning Machines

- A. Use
- B. Safety
- C. Set-ups
- D. Parts and functions
- E. Types of machines

VI. Blueprint Reading and Interpretation

VII. Metrology/Dimensional Measurement

- A. Types of measuring instruments
- B. Scales and rules
- C. Micrometer
- D. Height gage and vernier-scale

VIII. Milling Machines

- A. Vertical mills
- B. Horizontal mills
- C. Components, controls, and functions
- D. Care
- E. Safety
- F. Tooling operations
- G. Set-up
- H. Feeds
- I. Speeds
- J. RPM

IX. Drill Presses

- A. Types
- B. Care
- C. Safety
- D. Uses
- E. Drill speeds
- F. Feeds
- G. RPM
- H. Drill bits
 - 1. sharpening
 - 2. nomenclature

X. Saws

- A. Types
- B. Care
- C. Safety
- D. Set-up
- E. Uses

XI. Hand Tools

- A. File types
- B. Hammers
- C. Hacksaws
- D. Safety

Topics and Scope cont.

E. Vises

XII. Careers in Machine Tool Technology

- A. Career options
- B. Workplace ethics
- C. Professionalism

Representative Assignments

1. Reading from assigned text, approximately 15 pages per week.
2. Weekly quizzes based on reading.
3. Lab projects related to creating hand and machine tool components.
Projects will be graded for skill demonstration and problem solving and may include:
 - a. on a lathe, produce a hand tool by manufacturing parts & components;
 - b. set up a mill and mill a metal plate from a blueprint;
 - c. grind a tool bit, calculating and setting appropriate angles.
4. Compile a lab notebook of course notes and handouts.
5. Organize workspace and clean-up lab area.
6. Final written and performance exams.

Lab Activities

Lab activities consist of worksheets and exercises assigned by the instructor. These activities are coordinated with, and related to, classroom lecture/discussion topics. **The lab/shop sessions are not to be used for personal projects.**

The following Lab procedures and precautions must be observed:

- **Safety First!**
 - Safety glasses must be worn when tools/equipment are in use. Everyone in the shop must wear safety glasses during the scheduled lab period.
 - No jewelry may be worn when working in the shop. This includes rings, necklaces, and anything that hangs loose or may dangle into a rotating device or a potential electrical shock area.
 - No loose clothing is allowed while working in the Lab. Loose attire may become tangled in machinery.
 - Long hair must be securely tied back or secured in some fashion. Loose hair may become tangled in machinery and torn off or result in even greater bodily damage.
 - **No sandals in the Lab!** Non slip sole work shoes are preferred, but in all cases closed toed shoes must be worn.
 - You must know where the fire extinguishers, first aid kit, eye wash stations, and shower stations are located, and **be familiar with how to use these safety items.**
- You are expected to arrive at work (the Lab) on time and stay until quitting time (end of Lab). Do not leave class early without checking with your instructor. Participation is a part of your final grade!

Course Schedule and Outline

The instructor will distribute the *Syllabus* and *Weekly Class Schedule* at the first class meeting. It will contain detailed class information concerning:

- Important dates
- Reading assignments
- Due dates for written assignments
- Quizzes
- Examination dates

Course: Mach 51A**Semester: Spring 2022****Section: 4363**

Day Class Begins:	Thursday 01/20/2022
Day Class Ends:	Thursday, 05/14/2022
Day/Time of Final Exam:	Thursday, 05/26/2022 6:00-9:00 PM
Last Day to Add without instructors approval:	01/25/2022
Last Day to Add with instructors approval:	02/06/2022
Last Day to Drop And be eligible for enrollment/course fee refund:	01/30/2022
Last Day to Drop Without a "W" symbol:	02/06/2022
Last Day to drop With a "W" symbol:	04/24/2022
Last day to OPT For Pass/No Pass	N/A
First Census Date:	02/07/2022
Mid-Term Date:	Thursday 05/02/2022

SPRING SEMESTER 2022TBD Spring class schedule available (www.santarosa.edu) *

January 17, 2022	Dr. Martin Luther King Jr. Day Holiday (No classes)
January 18, 2022	Departmentally Determined Professional Development Activities Day (No classes)
January 19, 2022	CLASSES BEGIN
January 25, 2022 add code	Last day to register/add semester length class without instructor's signature or add code
January 30, 2022	Last day to drop semester length class and be eligible for a refund
February 6, 2022 add code	Last day to register/add semester length class with the instructor's signature or add code
February 6, 2022	Last day to drop a semester length class without "W" symbol
February 7, 2022	First Census Day
February 17, 2022	Mandatory Professional Development Activity Institutional Day (No classes)
February 18, 2022	Lincoln's Day Holiday Observance (No classes)
February 19-20, 2022	Saturday and Sunday (Classes will meet)
February 21, 2022	Washington's Day Holiday (No classes)
February 27, 2022	Last day to opt for P/NP for a semester length class
March 21-27, 2022	Spring Break (No classes)
March 25, 2022	Professional Development 1/2 Flex Day (No classes or activities)
March 28 -April 24, 2022	Midterm progress indicators posted in student portal

April 24, 2022	Last day to drop a semester length class with "W" symbol
May 21-27, 2022	Final Examinations
May 28, 2022	Commencement Exercises
May 30, 2022	Memorial Day Holiday (No classes)
June 3, 2022	Final grade rosters due
June 6, 2022	Spring semester processing finalized

EMAIL: I will send emails during the semester containing information about upcoming quizzes, examinations, assignments, and other news of immediate importance such as class closure on short notice. **Check your email account daily** (and make sure you're checking the email account that you have on record with SRJC). **NOTE:** emails should also appear as an announcement in your student portal. **Check your portal regularly.**

Course Policies

Cell Phones: ***Cell phone use is not allowed while in class or lab***, except for emergency calls. This is also a common employer's shop rule (no cell phone use during work hours). If you do receive an emergency call, please step outside the room to talk.

Cheating/Plagiarism: Cheating or plagiarism are unacceptable behavior and will result in an immediate two day suspension from class for all students involved; ***no exceptions.***

Attendance/Tardiness: Your attendance is expected at all class meetings and tardiness is not acceptable. Consider this as valuable training for the work place; your employer will expect you to be at work daily. You are expected to remain in class or lab until dismissed by the instructor (this policy is also common in an employee/employer relationship)

No Smoking Policy: Santa Rosa Junior College is a non-smoking campus. No smoking is allowed anywhere on campus or within 20 feet of the campus. ***This includes e-cigarettes!***

Class Participation: Your participation in class discussions is recommended and expected. Asking questions is a short cut to knowledge.

Missed Exams or Assignments: Missed examinations are discouraged, but may be rescheduled with the instructor on a case-by-case basis. Assignments (lab sheets, homework, etc.) should be turned in on the dates noted in the course outline. **Late assignments are discouraged and will not be accepted more than two weeks past the due date.**

Lab Safety: Safe procedures take precedence over everything else in our shop! Safe clothing must be worn at all times. Safety glasses must be worn when working on projects in the shop.

Class Disruption: Be respectful of your classmates and instructor. Please do not engage in disruptive activities such as these:

- **Monopolizing the class** discussion and interrupting others while they speak. Participation is a good thing, but monopolizing the class is not.
- **Carrying on private conversations** during class. ***You may think that your voices are low, but your talking will disrupt the class!*** If your conversation pertains to the class, please speak up at an appropriate time.
- **Bringing pets to class.** Unless the pet is a registered aid animal (check with DRD), do not bring it to class.
- **Bringing children to class.**
- **Eating in class.** It's disruptive due to noise, and often smells offensive to the class.

Student Conduct Policies:

Please visit the following web links and familiarize yourself with the policies of SRJC concerning student conduct. **You are responsible** for your conduct and for complying with SRJC policies.

<https://student-conduct.santarosa.edu/>

Tests and Quizzes

- You will be given periodic quizzes. ***Check your copy of the weekly class schedule regularly for exam dates.***
- You will be given a midterm examination and a final examination.
- ***Final examination will be administered on 05/26/2022 from 6:00 p.m. until 9:00 p.m.***

Study Tips

- ***Take notes during class***, and use your class notes to study for exams.
- Keep your quizzes and use them to study for midterm and final exams.

Grading

Your grades will be based on the following areas and count in the percentages noted:

Writing: Assessment tools that demonstrate writing skill and/or require students to select, organize and explain ideas in writing. Examples are: Compile a lab notebook.

10 - 20%

Problem solving: Lab worksheets and reports and assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills. Examples are: lab worksheets/workbook, and repair orders...

20 - 30%

Skill Demonstrations: All skill-based and physical demonstrations in the machine tool lab used for assessment purposes including skill performance exams. Examples are: shop skills, component identification and diagnostic skill...

20 - 30%

Exams: Performance exams, Component identification, and all forms of formal testing other than skill performance exams. Exams may be: multiple choice, true/false, or written answer...

20 - 30%

Other: Includes any assessment tools that do not logically fit into the above categories. Examples are: your notebook, homework, attendance, and participation...

20 - 30%

Extra Credit: The instructor will notify you when extra-credit is available.

Unless otherwise informed by the instructor, grades are calculated based on total semester points that you have earned. Grades may be adjusted to a class curve, but you are guaranteed the grade listed in the following chart if you attain the point total associated with that grade.

Letter grade A = 90% - 100% (greater than XXX points)

Letter grade B = 80% - 90% (XXX-XXX)

Letter grade C = 70% - 80% (XXX-XXX)

Letter grade D = 60% - 70% (XXX-XXX)

Letter grade F = ≤ 60% (less than XXX)

Emergency Evacuation Plan

In the event of an emergency during class that requires evacuation of the building, please leave the building immediately, but calmly. **Our class will meet at the Northwest end of Lounibos Hall in the parking lot** to make sure everyone got out of the building safely and to receive further instructions. If you are a student with a

disability who may need assistance in an evacuation, please see me during my office hours as soon as possible so we can discuss an evacuation plan.

Campus Resources

SRJC has many resources for its students. These are only a few of them. Please refer to the SRJC website for more information (www.santarosa.edu). Click the "For Students" tab, then the "Student Services" tab.

DRD (Disability Resources Department)

If you are having trouble learning or understanding in class and don't know why, you can get a free consultation at DRD. ***It may change your life!***

Just a few of the DRD services:

- Disability screening
- Test taking help
- Aids for the physically disabled

Santa Rosa Campus DRD Office information:

Email: disabilityinfo@santarosa.edu

Phone: (707) 527-4278

TTY: (707) 528-2442

Fax: (707) 524-1768

Office Location: Room 637, Analy Village, Bldg. C

Office Hours:

Fall & Spring Semesters: Monday-Thursday, 8:00 AM to 5:00 PM
Friday, 8:00 to 12:00 PM

Summer Semester: M-Th, 8:00 AM to 5:00 PM, Closed Friday

Mailing Address:

Santa Rosa Junior College

Disability Resources Department.

1501 Mendocino Avenue

Santa Rosa, CA 95401-4395

College Skills/Tutoring Department

- ESL (English as a second language)
- Math skills improvement
- Writing skills classes

The College Skills Department is located in Analy Village, on the west side of campus.

The Academic Skills Lab is located in Building H, Rm 601.

The Math Lab is in Building F, Rm 615.

The Department Office is in Building G, Rm 605.

The Phone Number is (707) 527-4834.

Campus Resources Cont.

Counseling Department

Santa Rosa Campus

Bertolini Student Center, 2nd Floor

(707) 527-4451

M, T, Th.: 8:00 AM - 4:30 PM

W, 8:00 AM - 6:30 PM

F, 8:00 AM - 2:30 PM

Closed Fridays during June & July

“As a new student, seeing a counselor is probably the most important thing you can do”. You don’t need to go through SRJC without a clue! Hook up with a counselor. You may just find a friend, guide and advocate in the Counseling Department. At the least, you will formulate a plan of study and explore your interests and life possibilities.

Doyle Library

- Tutoring
- Computer use (free)
- Coffee shop
- Quiet study space

Accommodations for Students with Disabilities

If you need disability related accommodations for this class, such as a note taker, test taking services, special furniture, helper animal, etc., please provide the Authorization for Academic Accommodations (AAA letter) from the Disability Resources Department (DRD) to the instructor as soon as possible. You may also speak with the instructor privately during office hours about your accommodations. If you have not received authorization from DRD, it is recommended that you contact them directly. DRD is located in Analy Village on the Santa Rosa campus, and Jacobs Hall on the Petaluma Campus.

Attendance:

Please review the official SRJC attendance policy shown below:

According to the SRJC policy, **four missed days is considered excessive. For an absence to be excused, you must clear the absence with the instructor.**

8.1.5
ATTENDANCE REQUIREMENTS
ADOPT: APRIL 8, 1985
REVISED: NOVEMBER 14, 1995
REVISED: NOVEMBER 14, 2000
REVISED: FEBRUARY 14, 2006
REVISED: JULY 10, 2007
REVIEWED: FEBRUARY 12, 2008
REVISED: JUNE 9, 2009
REVISED: MAY 11, 2010
TITLE 5: 58004

It shall be the policy of the Sonoma County Junior College District to maintain an attendance policy and procedures consistent with State and local requirements.

1. Attendance

- a. Students are expected to attend all sessions of the course in which they are enrolled.
- b. Any student with excessive absences may be dropped from the class.

2. Excessive Absence Defined

- a. A student may be dropped from any class when that student's absences exceed ten percent (10%) of the total hours of class time.
- b. Instructors shall state in each course syllabus what constitutes excessive absence for that course.

3. Excused vs. Unexcused absences

- a. Unless state or federal law requires that the absence be deemed excused, no instructor shall be required to make a distinction between excused and unexcused absences.

Attendance cont.:

- b. If individual Instructors wish to distinguish between excused and unexcused absences the instructor shall state in each course syllabus all criteria for any excused absences in addition to those required by state or federal law.

4. Nonattendance

- a. Students who fail to attend the first two class meetings of a full semester course, or the first class meeting for classes that meet once a week may be dropped by the instructor. For classes that meet online, students must log on and initiate participation by 11:59 p.m. of the third day from the official start date of the class.
- b. Faculty are required to drop all No-Show students by the Census Date of each census course. A No-Show is an enrolled student who has not attended any class meeting of the course at any time, or who has not contacted the instructor to make arrangements to remain enrolled in the course. For classes that meet online, a No-Show is an enrolled student who has not logged on and initiated active participation by 11:59 p.m. of the third day from the official start date of the class.

SRJC Enforces No-Smoking Ordinance on Campuses and Sites

At the opening of the fall semester starting August 17, 2009, the Santa Rosa Junior College District Police will begin issuing citations to enforce the City of Santa Rosa's no-smoking ordinance on and near the Santa Rosa Campus and SRJC's Southwest Center.

Smoking is prohibited not only *on* the college's property, but also *within 20 feet* of all Sonoma County Junior College District property. This means that smoking is also prohibited on the sidewalks and a portion of the city streets adjacent to college property.

City fines for smoking ordinance violations are up to \$100 for the first offense, \$250 for the second offense, and \$500 for each subsequent offense.

SRJC is currently working with Sonoma County and the cities of Windsor and Petaluma to extend the same enforcement on and near *all* college sites.

Background information regarding SRJC's Smoke-free Policy

In January 1989, the Board of Trustees of the Sonoma County Junior College District adopted a smoke-free environment policy to promote a safe and healthy atmosphere for students, faculty, staff, and visitors to its campuses, centers, and multiple sites. This policy was revised in April 2005 to clearly state that tobacco use is prohibited both indoors and outdoors on district-controlled property.

Despite this policy and clearly worded signage across SRJC sites, smoking has not only continued, but it has become increasingly worse. In response, the District's Associated Students initiated a move toward stronger policy enforcement, specifically the ability of District Police to issue citations to policy violators. It was determined that the best way for SRJC to issue citations is through the enforcement of state, county, and city laws and ordinances.

The District has entered into an agreement with the City of Santa Rosa that specifically grants SRJC's District Police the authority to enforce the city's nonsmoking ordinances on or near District property, and with that agreement, SRJC's District's Police now has the legal authority to issue city citations to violators of the college's smoke-free policy, both on and within 20 feet of District property in Santa Rosa.

At SRJC's Board of Trustees meeting on July 14, 2009, Board Procedure 6.8.6P was revised - Smoke-Free Environmental Procedural Guidelines - to include the following language: "...the Sonoma County Junior College District Police shall enforce all state, county, and city ordinances that prohibit smoking on or near District Property."

Machine Tool Technology

Course Schedule Spring 2022 MACH 51A - Section 4363 Thursday 6:00-10:00 PM

Text: Precision Machining Technology 3rd ed. By Peter Hoffman, Eric Hopewell

Reading assignments are expected to be completed prior to the indicated date. Quizzes may be expected at any lecture session and will cover current assignments, as well as previous lectures, demonstrations, and reading assignments. *Please note that this is a tentative schedule and that it is subject to change.*

Note: All quizzes and exams are timed. Notes and a calculator are permitted.

	DATE	LECTURE	LAB	TEXT
1	01/20	Introduction Safety	Safety test	3-23 39-57
2	01/27	Semi-Precision Measuring Precision Measuring	Measuring exercise Measurement Worksheet Quiz 1	79-93 94-147
3	02/03	Layout and Hand Tools	Measuring exercise cont. Introduce Project 1 (Drill gage) Horiz. Bandsaw operation sheet Quiz 2	234-251 252-268
4	02/10	Drilling, Threading, Tapping, and Reaming Introduction to the Drill Press	Drill press demonstration Drill press operation sheet Measuring exercise is due Quiz 3	296-315 316-323
5	02/17	Professional Development - No Class		
6	02/24	Cutting Tools and Tooling for the Drill Press RPM Calculation	Quiz 4	324-339 340-357
7	03/03	Offhand Grinding	Grinding demonstration Pedestal grinder operation sheet Grind twist drill Quiz 5	286-295
8	03/10	Understanding Drawings	Project 1 Drill Gage is due Prep sheet, Mill exercise Quiz 6	202-233
9	03/17	Introduction to the Vertical Milling Machine	Introduce Project 2 (Mill exercise) Milling machine demonstration Milling machine operation sheet Quiz 7	469-482
10	03/24	Spring Break – No Class		
11	03/31	Tools and work holding for the Vertical Mill Vertical Milling Machine Operations Review for Midterm Exam	Ground twist drill due Prep Sheet Due Quiz 8	483-503 504-546
12	04/07	MIDTERM EXAM		
13	04/14	Introduction to the Lathe Workholding and Toolholding Devices for	Mill Project due Introduce Project 3 (Lathe) Lathe demonstration	359-368 369-401

	DATE	LECTURE	LAB	TEXT
		the Lathe	Lathe operation sheet Quiz 9	
14	04/21	Machining Operations on the Lathe	Project 3 (Lathe part 2) Quiz 10	402-431
15	04/28	Manual Lathe Threading		432-451
16	05/05	Saws and Cutoff Machines	Quiz 11	269-285
17	05/12	Metal Composition and Classification	Lathe project due Quiz 12	158-174
18	05/19	Review for Final Exam	<u>ALL LAB PROJECTS DUE</u>	
19	05/26	FINAL EXAM	THURSDAY 6:00PM - 9:00PM AVAILABLE IN CANVAS 5/23/2022 THRU 5/26/2022	

IMPORTANT DATES such as last day to drop a class without receiving a grade etc., are found at the following URL:
<http://admissions.santarosa.edu/academic-calendar>