



Frank Phillips College
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1. General Course Information

1.1. Course Number: MCHN1313 48.0501

1.2. Course Title: Basic Milling Operations

1.3. SCH [Semester Credit Hours]: 3 CEU [Continuing Education Units] 4.8

NB: CLASS CAN NOT BE TAKEN FOR BOTH ACADEMIC AND CEU CREDIT

1.4. **Pre-requisites:** None, but some metal working and precision measurement/layout experience *very* helpful

1.5. **Co-requisites:** none

For actual course content and some [non-copyrighted] course handouts

go to <http://www.fpc.cc.tx.us/>

click on <Virtual Campus>

click on <Blackboard Log-In>

click on <login>

click on <preview>

click on the <courses> tab at the top

click on <browse course catalog>

click on <MACH1313> or other course of interest

1.6. Course Description:

An introduction to the common types of milling machines, basic parts, nomenclature, basic operations and procedures, machine operations, safety; machine mathematics; blueprint reading; and theory

1.7. Instructor's Description:

While the use of trig formulas, gear ratio calculation and conversion of between/among decimal inch, fractional inch and metric dimensions are an integral part of the trade, in this class these concepts are embedded and contextualized by extensive application in many "hands on" activities which stress both safety and the production of useful traditional apprentice machinist's projects. Supporting activities such as print reading, layout, tool grinding, and precision "set-up" are stressed. This class emphasizes the safe and efficient operation of the traditional manual vertical turret mill, for the low-volume production or modification of items with minimal "attachments" or special tooling, that is traditional "craft" machining.

1.8. Audience:

This class is intended for people wishing to learn how to safely and efficiently operate the traditional vertical turret "Bridgeport" mill. **Single unit production of prototypes, models, repair parts, etc. is stressed, with minimal reliance on special tooling, attachments or accessories. This course will be of particular interest to individuals employed in maintenance or repair activities where replacement parts may not be easily obtainable, and persons interested in home shop or hobby machining.** *This course stresses traditional "craft" machining and while not intended to produce "tool and die makers" or experts in high volume factory production, this course will provide a good introduction to the basic metal working processes and activities underlying these trades.*

1.9. Semester/year

2. Instructor:

- 2.1. **Name:** Dr. F. George McDuffee¹
- 2.2. **Office:** Library Building Room L10 or CAI-104A on the Borger Campus
- 2.3. **Phone:** (w) 806.274.5311 X791 (L10) or X806 (CAI104) (h) 806.274.2113
- 2.4. **Office Hours:** 9AM/4PM M-F however call as I am frequently out of the office or try CAI-104A
- 2.5. **Email:** gmcduffee@fpc.cc.tx.us

3. Objectives of this class:

At the conclusion of this class, the successful learner will be able to:

- 3.1. demonstrate safety at all times by following all safety rules and procedures when using machine tools such as, shears, hydraulic presses, saws gauges, milling machines, lathes, abrasive machines, cut off saws and tools, drill presses and when handling materials.
- 3.2. identify and name general and typical dangers in the industrial work environment.
- 3.3. name, identify and properly use personal protective equipment (PPE) when and where required.
- 3.4. describe milling machine parts and functions;
- 3.5. use formulas to calculate speeds and feeds;
- 3.6. identify types of milling machines;
- 3.7. describe the difference between climb and conventional milling,
- 3.8. calculate speeds and feeds for milling machines;
- 3.9. set-up milling machines at beginning level; and
- 3.10. operate milling machines at beginning level.

4. Textbook and Other Required Materials

- 4.1. NONE: however the student will find the texts listed under supplemental references to be helpful.
- 4.2. Web access and an E-mail account to allow access to “Blackboard”
- 4.3. Quad ruled (5 X 5) composition book, 10 X 7-7/8 AmPad#26-252 or similar. Available FPC bookstore.
- 4.4. Soft lead (#2 or softer) pencil with eraser or erasable ball point pen, Available FPC bookstore
- 4.5. Required materials and supplies for the basic class projects are included in the fee for this course. *Supplementary projects or production of multiple project items may incur additional material charges at the discretion of the instructor.*
- 4.6. File folder or jumbo envelope for class hand outs
- 4.7. Safety glasses/goggles or face shield
- 4.8. Suitable shoes or boots – absolutely no open toed sandals, clogs or “flip-flops.”

5. Classroom Policy and Instructor Expectations

- 5.1. The students and instructor will show mutual respect at all times. *Please see the S.C.A.N.S. section below for additional discussion on this point.*
- 5.2. Behavior inconsistent with a safe and student-friendly learning environment for all students is not acceptable. *Please see the S.C.A.N.S. section below for additional discussion on this point.*
- 5.3. Habits of neatness and safety are common workplace requirements. They are therefore required in this class. *Please see the S.C.A.N.S. section below for additional discussion on this point.*
- 5.4. Honesty is expected of all students. Cheating and plagiarism are violations of honesty. Cheating occurs whenever one uses deceitful means, for example crib notes or copying assignments. Plagiarism is presenting the language and ideas of another as ones own work such as copying papers, themes, abstracts, sections of books, magazine articles, etc.

¹ AS Coffeyville Junior College 1960, BS [Applied Mathematics and Statistics] Southern Illinois University at Edwardsville, 1969, MS [Manufacturing Technology] Pittsburg State University 1993, EdS [Industrial Education] Pittsburg State University 1995, EdD [Occupational and Adult Education] Oklahoma State University 1999. With some overlap, 30 years manufacturing, 15 years consulting [technology transfer] and 10 years teaching.

6. Additional/Supplemental References

- 6.1. Edwards, John G. (1998) Turret Mill Operation Cincinnati, Ohio Hanser Gardner Publications

The student is encouraged but not required to read and possibly purchase the following texts. *Many of these items are available in the FPC library in the Mac and Betty McDuffee Foundation collection.*
- 6.2. Milne, Lorus J., Machine Shop Methods, [reprint] Lindsay Publications, Bradley, IL
- 6.3. Kibbe, Neely, et al, Machine tool Practices, 7th Edition, Prentice Hall, Upper Saddle River, NJ, Available FPC bookstore. Note: This text is expensive but is used in several technology classes and is a good reference.
- 6.4. South Bend Lathe, South Bend Lathe Machine Shop Projects, [reprint] Lindsay Publications, Bradley, IL
- 6.5. Horner, Joseph, Practical Metal Turning, [reprint] Lindsay Publications, Bradley, IL
- 6.6. Hasluck, Paul N., Hasluck's Metalworking Tools, Materials & Processes, [reprint] Lindsay Publications, Bradley, IL
- 6.7. Smith, Robert H., Elements of Machine Work, [reprint] Lindsay Publications, Bradley, IL
- 6.8. Smith, Robert H., Advanced Machine Work [reprint] Lindsay Publications, Bradley, IL
- 6.9. Henry Ford Trade School, Shop Theory, [reprint] Lindsay Publications, Bradley, IL
- 6.10. Oberg, Jones, Horton, et al. Machinery's Handbook 26th edition, Industrial Press, New York [note earlier editions may be more suitable as these emphasize manual machining techniques, older manual machines, materials, techniques and processes]
- 6.11. Lautard, Guy The Machinist' Bedside Reader, Guy B.E. Lautard; ISBN: 0969098030; (December 1988)
- 6.12. Lautard, Guy The Second Machinist' Bedside Reader and the Bull's Eye Mixture, Guy B.E. Lautard; ISBN: 0969098030; (December 1988)
- 6.13. Lautard, Guy The Third Machinist' Bedside Reader, Guy B.E. Lautard; ISBN: 096909809X; (June 1, 1993)
- 6.14. Moltrecht, Karl H., Machine Shop Practice, 2nd ed., Vol I, Industrial Press, New York ISBN: 0-8311-1126-7
- 6.15. Moltrecht, Karl H., Machine Shop Practice, 2nd ed., Vol II, Industrial Press, New York ISBN: 0-8311-1132-1
- 6.16. Jones, Franklin D., Machine Shop Training Course 5th Ed, Vol I, ISBN: 0-8311-1039-2 Industrial Press, New York (1964)
- 6.17. Jones, Franklin D., Machine Shop Training Course 5th Ed. Vol II Industrial Press ISBN: 0-8311-1040-6 (1964)
- 6.18. Hoffman, Edward G. and McCauley, Christopher, J. Shop Reference for Students and Apprentices, 2nd ed. Industrial Press, New York (2001) ISBN 0-8311-3079-2
- 6.19. Anderson, John G. Technical Shop Mathematics, 2nd ed. (1983) Industrial Press, New York ISBN 0-8311-1145-3
- 6.20. The instructor will provide additional handouts during class

7. Methods of Evaluation & Schedule

- 7.1. Schedule TBA -- actual operation of milling machine will be stressed
- 7.2. Student project(s) will be a major portion of final grade. Two suggested projects are:
 - 7.2.1. One or more quick-change tool holders for lathe [suggested for students in the machining program]
 - 7.2.2. Reverse dial indicator fixture for shaft alignment [suggested for students in the millwright / machinery-maintenance program]

8. Attendance Policy

- 8.1. While attendance in many college classes is optional, ***attendance in life and at work is not***, therefore all participants are expected to attend all sessions. *Please see the S.C.A.N.S. section below for additional discussion on this point*

- 8.2. I do not waste my or the class's time by presenting unimportant or non-essential information, therefore every class is important.
- 8.3. Much of the material is cumulative, that is to understand material presented in class two it is essential that you attended class one.
- 8.4. Participation is an important part of life, and class participation is a significant element in student evaluation. If you do not attend, you can't participate. Please see the S.C.A.N.S. section below for additional discussion on this point.
- 8.5. It is assumed that you are participating in this class to obtain skills and knowledge. It is obvious that if you do not attend, you cannot obtain these skills and knowledge.
- 8.6. ***FPC has excellent relations and high credibility with the area employers.*** A major factor in this is that our graduates have traditionally exhibited high "on-the-job" performance consistent with the skills and knowledge described in the course syllabi. The only way to maintain these relationships and credibility is to insure that every student is presented with the opportunity to obtain these skills and knowledge, and verification of the acquisition of these skills and knowledge, which obviously requires class attendance.
- 8.7. One of the most valuable and enjoyable aspects of adult education is the sharing of knowledge and experiences among the participants. If you do not attend, you cannot contribute your unique experiences and observations. Thus, your absences affect not only your learning opportunities but also the learning opportunities of all the other participants, which includes the instructor.

9. SCANS² Workplace Competencies Addressed in this Class:

- 9.1. Resources: Identifies, organizes, plans, and allocates resources:
 - 9.1.1. Time--Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules
 - 9.1.2. Money-- [included for completeness but not used in this class] Uses or prepares budgets, makes forecasts, keeps records, and makes adjustments to meet objectives
 - 9.1.3. Material and Facilities--Acquires, stores, allocates, and uses materials or space efficiently
 - 9.1.4. Human Resources--Assesses skills and distributes work accordingly, evaluates performance and provides feedback
- 9.2. Interpersonal: Works with others
 - 9.2.1. Participates as Member of a Team--contributes to group effort
 - 9.2.2. Teaches Others New Skills
 - 9.2.3. Serves Clients/Customers--works to satisfy customers' expectations
 - 9.2.4. Exercises Leadership--communicates ideas to justify position, persuades and convinces others
 - 9.2.5. Responsibly challenges existing procedures and policies
 - 9.2.6. Negotiates--works toward agreements involving exchange of resources, resolves divergent interests
 - 9.2.7. Works with Diversity--works well with men and women from diverse backgrounds
- 9.3. Information: Acquires and uses information
 - 9.3.1. Acquires and Evaluates Information
 - 9.3.2. Organizes and Maintains Information
 - 9.3.3. Interprets and Communicates Information
 - 9.3.4. Uses Computers to Process Information
- 9.4. Systems: Understands complex inter-relationships
 - 9.4.1. Understands Systems--knows how social, organizational, and technological systems work and operates effectively with them

² Secretary's Commission on Achieving Necessary Skills
See <http://pueblo.pc.maricopa.edu/MariMUSE/SCANS/SCANS.html> for details.

- 9.4.2. Monitors and Corrects Performance--distinguishes trends, predicts impacts on systems operations, diagnoses deviations in systems' performance and corrects malfunctions
- 9.4.3. Improves or Designs Systems--suggests modifications to existing systems and develops new or alternative systems to improve performance
- 9.5. Technology: Works with a variety of technologies
 - 9.5.1. Selects Technology--chooses procedures, tools or equipment including computers and related technologies
 - 9.5.2. Applies Technology to Task--Understands overall intent and proper procedures for setup and operation of equipment
 - 9.5.3. Maintains and Troubleshoots Equipment--Prevents, identifies, or solves problems with equipment, including computers and other technologies

10. Other Recommended Courses in Sequence: (may be taken in any order)

- 10.1. MCHN 1343 Machine Shop Mathematics
- 10.2. MCHN 2303 Fundamentals of CNC machine controls
- 10.3. MCHN 1330 Statistical Process Control for Machinists
- 10.4. MCHN 1326 Introduction to Computer Aided Manufacturing [CAM]
- 10.5. MCHN 1305 Metals and Heat Treatment
- 10.6. MCHN 1319 Manufacturing Processes and Materials
- 10.7. MCHN 1320 Precision Tools and Measurements
- 10.8. MCHN 1332 Bench Work and Lay Out
- 10.9. MCHN 1358 Intermediate Lathe Operations
- 10.10. MCHN 2303 Intermediate Milling Operations
- 10.11. MCHN 1335 Grinders, Outside, Inside and Surface

11. Frank Phillips College [FPC] General Policies:

- 11.1. **Assessment of Student Academic Achievement** - *Student learning is central to all that we do at the College.* Faculty assess student learning in a variety of ways, including in-course assessments, portfolios, certification examinations, employer surveys, transfer studies, and many others. The College measures its effectiveness through the results of our assessment of student learning and uses those results to improve student learning. **This two-way feedback is critical to our ongoing efforts to improve and expand our instructional efforts.**
- 11.1. **Students with Disabilities** - It is FPC's policy to provide reasonable accommodations to students with disabilities. Our goal is to help students succeed in this course. If you have a physical, mental, or learning disability and you need a reasonable accommodation to help you achieve success, please contact Toni K. Cyan-Brock, Title IV Director (LIB 19 phone EXT 753). To best provide the accommodation you need, make this request as soon as possible, since **accommodations cannot be made to change a grade you have received for course work already completed.**
- 11.2. **Tutoring Services** - Tutoring services are available for most courses. These services are provided free of charge. Tutoring is provided by professional and student tutors. Tutor request cards are located at Student Services. For information, please call EXT 753.

- 11.3. **Course Withdrawal** - If for any reason you cannot complete this or any other course, you must officially withdraw from the class. Even if you never attend class, if you are officially enrolled in a course, you will receive a grade for the course unless you complete and submit a drop form with appropriate signatures to the registrar. If you have not completed all of the work, that grade can only be an F. Drop forms are available in the division office, in the counseling office, or from the registrar. After midterm, you must have the instructor's permission to withdraw from a class; therefore, his or her signature must be on the form before you submit it to the registrar. For the last date to withdraw without the signature of the instructor, check the quarterly schedule. *If you do decide to withdraw from a class and have any kind of financial aid, you should consult with the financial aid office prior to the withdrawal to determine what, if any, effect it will have on your status³.*
- 11.4. **Incomplete Grade** - If you have been progressing satisfactorily in a course, but for reasons beyond your control (death in family, personal illness, etc.) you cannot complete all of the requirements for the course, you can request an incomplete grade (I) from the instructor. If the instructor agrees, you will work out a mutually agreeable completion schedule. The instructor will complete a grade change form once the course work is completed. If the grade change is not submitted by the Friday of the fifth week of the following term (fall for both spring and summer), the grade will automatically change to an F.
- 11.5. **Academic Dishonesty** - Using the ideas, expressions, writings, etc., of another person and representing them as your own is one form of academic dishonesty and can result in severe penalties, including failure on a project or in a course. Plagiarism includes not only word-for-word copying *but also the use of the general ideas of another without giving appropriate credit to the source.*
- 11.6. **General Conduct:** Students are responsible for knowing the Law and Order [General Conduct and Behavior] Regulations in the college catalog.
- 11.7. **Children in Classes:** Children are not allowed in classes without the *prior* approval of the instructor. If permission is granted to bring a child into a class, it is the parent's responsibility to see that the child in no way disturbs other students or the class in general. Even after permission is granted, the instructor always has the right to ask a parent and child to leave a class if any kind of disruption takes place. Individuals who bring children to the college for any reason are expected to supervise them at all times.

12. Course Specific Notes:

- 12.1. **The chips generated by the milling process are very sharp.** Student should be very careful about tracking these chips into their homes, as these are painful when stepped on.
- 12.2. **Do not assume that any tools or materials you leave here will be here when you return.** Either take your tools and materials with you or secure these in the wall lockers provided. See the instructor for wall locker assignment if you want one.
- 12.3. **The serious metal working student is encouraged but not required to buy their own small hand and precision measuring tools.** Frequently a person will produce better work using tools with which they are familiar (i.e. their own), even if these are less expensive, than tools with which they are unfamiliar, even if these are the most expensive.

³ For example, a change from enrollment for 12 or more semester credit hours [SCH] to less than 12 SCH is a change from full-time to part-time student classification which may affect scholarships, athletic eligibility, student loan category and draft status.