Advanced Technology Division

Manufacturing Technology Unit Plan

Lane Community College

Revised 3/16/05

Advanced Technology Division

Manufacturing Technology Unit Plan

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Alignment with the College

Manufacturing Technology is a credit instructional program and has been offered at Lane Community College since 1976. The program is administered under the Office of Instruction and Student Services through the Advanced Technology Division.

The Manufacturing Technology program is centrally aligned with the College's strategic directions, core values, and learning centered principles.

Strategic Directions

Achieve Financial Stability: This program demonstrated a reduction in cost per student for FY03. This means more students were served with less funds while maintaining the excellent quality of the program.

Enhance the College Climate: This program actively recruited students from under-representative populations.

Core Values

Learning: Student learning is both theoretical and applied. Students progresses from basic to advanced technical, academic and employability skills.

Diversity and Accessibility: The program faculty welcome students from diverse backgrounds. Students with special needs are accommodated with appropriate supplemental learning technologies and experiences.

Innovation: Faculty maintain their expertise in the field and incorporate advanced technologies in the curriculum. The faculty have made a commitment to maximize the use of innovative instructional technologies to transform the curriculum. Some examples of this include transferring lecture notes to PowerPoint and assisting the division in developing a technical common core curriculum.

Collaboration and Partnership: The faculty work very closely with their program advisory committee. This committee is a representation of active community business partners who provide advice and program support. The Manufacturing Technology faculty also work very closely with other divisional programs, especially Aviation Maintenance Technology and Avionics Technology.

Integrity: The program faculty have demonstrated a high degree of integrity. They are openly accountable to perform according to the policies, procedures and expectations of the College, the division, the advisory committee, and most importantly, the students.

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Learning Centered Principles

Substantive Change in Individual Learners: The Manufacturing Technology program excels in transforming student lives. This transformation is demonstrated when a new student enters the program without entry level skills and can complete the two-year program to obtain a high-wage career in the manufacturing industry.

Document Learning Success: As students progress through the program, they obtain the required training to gain entry level employment in the Manufacturing industry.

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Unit Description

The Manufacturing Technology program is an occupational, preparatory, two-year Associate of Applied Science degree with a Computer Numerical Control Technician option and/or a two-year certificate of completion program.

The Manufacturing Technology program features state-of-the-art laboratories where students learn the basic principles and fundamentals in manufacturing (machine shop) and related work. The advanced equipment and expertise of the faculty make Lane's Diesel Technology program the best way to enter the field.

Faculty in the program bring considerable field experience to the classroom and regularly attend workshops at manufacturer training centers to help them keep up with technological changes in the industry.

The program provides classroom instruction and considerable shop training in the laboratories that prepares you for employment in manufacturing field. Graduates of this program begin careers in machine repair and maintenance shops for mill and construction contractors, and high tech and specialty machine shops.

This training can lead to employment in entry-level occupations with a median salary of $36,900 annually. The growth in this industry is expected to be slower than average. Annual new openings are expected to be much higher than average. Outlook for this and related occupations is dependent on manufacturing industry activity levels. During periods of industry growth, reasonable opportunities would exist for competitively trained workers. Those with an associate’s degree would have a competitive advantage in this labor market.

New students can enter the program at the beginning of fall, winter, or spring terms. For consent to enroll in major courses, students must attend a program orientation in fall terms (dates available in Counseling of the Student’s First! Center) or contact the department advisor/counselor in winter and spring terms. All interested applicants should complete placement testing (Assessment & Testing Office, Building 1) in reading, writing and math. A minimum score of 68 in reading and 64 in Writing is required. Take testing results to the program orientation and/or advisor/counselor for assistance with course selections. Students are selected on a first-come, first-served basis by or date of application to this program.

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Degrees and Certificates

Two-Year Certificate of Completion	**Credits**
Two-Year Certificate of Completion Totals	**85-88**
First Year	
Fall	
Manufacturing Technology MFG 197	12
Applied Geometry for Technicians MTH 076 or higher	4
Total Credits	**16**
Winter	
Manufacturing Technology MFG 197	12
Workplace Safety HE 125 or First Aid HE 252 or PE/Health requirement	3
Total Credits	**15**
Spring	
CNC Lathe (G-Code) MFG 206	6
Manufacturing Technology MFG 197	6
Total Credits	**12**
Second Year	
Fall	
Manufacturing Technology MFG 197	12
Total Credits	**12**
Winter	
Manufacturing Technology MFG 197	12
Introduction to College Writing: Workplace Emphasis WR 115W or higher	3
Total Credits	**15**
Spring	
Manufacturing Technology MFG 197	12
Human Relations requirement	3
Cooperative Education: Manufacturing MFG 280 (optional)	3
Total Credits	**15-18**

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Two-Year Associate of Applied Science Degree	**Credits**
Two-Year Associate of Applied Science Degree Totals	**107-109**
First Year	
Fall	
Manufacturing Technology MFG 197	12
Applied Geometry for Technicians MTH 076 or higher	4
Math/Science/Computer Science requirement or CS 160 or CS 120	4
Total Credits	**20**
Winter	
Manufacturing Technology MFG 197	12
Workplace Safety HE 125 or First Aid HE 252 or PE/Health requirement	3
Applied Algebra for Technicians MTH 086 or higher	4
Total Credits	**19**
Spring	
CNC Lathe (G-Code) MFG 206	6
Manufacturing Technology MFG 197	6
Introduction to College Writing: Workplace Emphasis WR 115W or higher	3
Total Credits	**15**
Second Year	
Fall	
Manufacturing Technology MFG 197	12
Cad 1 DRF 167	4
Metallurgy: Fundamentals and Welding WLD 151	3
Total Credits	**19**
Winter	
Manufacturing Technology MFG 197	12
Arts & Letters requirement	3
Cooperative Education: Manufacturing MFG 280 (optional)	3
Total Credits	**15-18**
Spring	
Manufacturing Technology MFG 197	12
Human Relations requirement	3
Shielded Metal Arc Welding 1 WLD 121	4
Total Credits	**19**

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Computer Numerical Control Technician Option	Credits
Two-Year AAS with CNC Option Totals	**107-110**
First Year	
Fall	
Manufacturing Technology MFG 197	12
Applied Geometry for Technicians MTH 076 or higher	4
Math/Science/Computer Science requirement or CS 160 or CS 120	4
Total Credits	**20**
Winter	
CNC Lathe (G-Code) MFG 206	6
Manufacturing Technology MFG 197	6
Applied Algebra for Technicians MTH 086 or higher	4
Workplace Safety HE 125 or First Aid HE 252 or PE/Health requirement	3
Total Credits	**19**
Spring	
CNC Mill MFG 207	6
Manufacturing Technology MFG 197	6
Introduction to College Writing: Workplace Emphasis WR115W	3
Total Credits	**15**
Second Year	
Fall	
CAM 1 MFG 203	6
CNC: Special Projects MFG 208	6
CAD 1 DRF 167	4
Metallurgy: Fundamentals and Welding WLD 151	3
Total Credits	**19**
Winter	
CAM 2 MFG 204	6
Manufacturing Technology MFG 197	6
Mechanical Drafting DRF 121	4
Cooperative Education: Manufacturing MFG 280 (optional)	3
Total Credits	**16-19**
Spring	
CAM 3 MFG 205	6
Manufacturing Technology MFG 197	6
Arts & Letters requirement	3
Human Relations requirement	3
Total Credits	**18**

Cooperative Education

Cooperative Education (Co-op) offers students college credit and a grade for on-the-job work experience related to their educational and career goals. Through Co-op a student can integrate theory and practice, develop skills, expand career knowledge, and make contacts for the future. Work schedules and work sites vary. Under the supervision of the Manufacturing Technology Co-op Coordinator and with instructor consent, a maximum of 18 Co-op credits may be earned in lieu of required Manufacturing Technology course credits.

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Organizational Structure

Board of Education
President
Vice President of Instruction
Associate Vice President of Instruction
Division Chair Advanced Technology
Faculty Manufacturing Technology Program

Faculty/Staff

Name	***Al Hill***
Classification	Full-Time Faculty
Year Hired	
Degrees/Credentials	

Name	
Classification	
Year Hired	
Degrees/Credentials	

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Program Outcomes

Effectiveness Benchmarks	Description

Program Outcomes

All graduates can be expected to perform at entry-level position in both manual and/or CNC machine shops. Within two years they should be making family wage earnings with full benefits.

Benchmarks

Efficiency Benchmarks	Description
Student/Instructor Efficiency Ratio = 100%	Student/Instructor Ratio = 18:1 Efficiency Ratio = Reimbursable Student FTE / Instructor FTE / 18
Classroom Capacity Efficiency Ratio =100%	Ratio = Students / Average Classroom Capacity Efficiency Ratio = Ratio / 80%
Cost per Student FTE Efficiency Ratio = 100%	The division has developed a normalized business model based on operating benchmarks. This model predicts an expected cost per Student FTE. FY03 Predicted Cost per SFTE = $4,826 FY03 Actual Cost per SFTE = $4,142 Efficiency Ratio = Predicted Cost / Actual Cost
Local Employment Demand / Student Completers Efficiency Ratio = 100%	Lane county new positions are projected by the Oregon Labor Management Information System (OLMIS). Student completers are defined as those students who have completed at least 90 credit hours and have passed at least two ASE certification tests. Efficiency Ratio = New Positions / Student Completers
Student Persistence Ratio = 80%	Persistence is the measure of the percent of students who finish a sequential course and continue to the next sequential course in the next term. Ratio = Continuing Students / Prior Term Completing Students
Student Retention Ratio = 80%	Student retention is the percentage of students who were enrolled in the second week of the term and were enrolled at the end of the term. Ratio = End of Term 2nd Week Students / 2nd Week Students
Starting Wage Ratio Efficiency Ratio = 100%	Student Completers' Average Starting Wage / OLMIS Average Starting Wage. For FY03 OLMIS average starting wage was $10.99.

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Accreditations

Certificate and/or AAS Degree. Currently no national standards exist.

Core Abilities

The Manufacturing Program services four (4) student types. Percentages are approximate and vary per term.

1. Students with no prior experience with intent c\become accomplished machinist (30%)
2. Students already working as a machinist and take Manufacturing classes to upgrade their skills (30%)
3. Students who own their own machine tools abut lack the skills to successfully bring their entrepreneurial ideas to market (15%)
4. Students that are non-manufacturing majors from auto, diesel, welding and drafting that realize the benefit to their trades by having basic machining skills (25%)

Courses

Course Outcomes: Individual course outcomes are listed in course syllabi.

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Idealistic course outcomes: each student would deomonstrate skills required by the industry and advisory committee members to obtain entry level employment in the manufacturing industry.

Instructional Environment

See chapter 5

Advisory Committee

Program Operating Information – Trends

Performance Analysis

Enrollment Management
There are not enough machine tools or instructors to increase enrollment. If non-major students were taught with another instructor and in another time frame, that could allow increased enrollment of Manufacturing major students and allow more time for second year students. Non-majors are always first term students and are very time intensive for the instructor. This takes instructor time away from the advanced students.

Resource Management
Classroom and tooling upgrading is needed.

Labor Market Direction
Continuing high enrollment seems to suggest that the students are becoming skilled craftsmen and gaining employment as the economy grows.

Articulation Agreements
Potential exists for agreements with OIT and local high schools.

Instruction
Both instructors are interested in video as a medium of instruction. Time and resources is a barrier.

Unit Initiatives

Unit initiatives are separated into two categories: Maintenance Initiatives and Enhancement Initiatives.

Maintenance initiatives are requests for resources to maintain the existing levels of program efficiency and effectiveness. Maintenance initiatives respond to:

1) any mandatory changes in the program (recurring contracts, change in credits, implementing accreditation or other curriculum standards), and,
2) costs to maintain the existing curriculum and program equipment.

Enhancement initiatives are requests for new resources to implement substantive changes in the program, usually in response to student growth or new curriculua.

Needs

1. Two (2)-fulltime aides for Manufacturing 197, one instructional aide for shop maintenance.
Reasoning:
1. Instructional: Classes are over full; One instructor teaches variable credit students with enrollment in 6 different terms with the lab and classroom lectures all happening concurrently.
2. Maintenance: The Manufacturing shop is over 10,000 square feet with 40 major machine tools and thousands of tools and tooling components. The students are hard on all the equipment and continual on-going maintenance is needed during and after classes. Safety issues are re-enforced with both aide positions.

2. One (1)-half-time aide for CNC/CAM classes
Reasoning:
1. To provide for a constant source of teaching aide money to support the CNC/CAM instructor. This will make it possible to effectively cover instruction on the operation of the four CNC machines in room 107 and the same time. CAM is being taught in room 119.

3. Increase the annual MS Money or provide for a large ($10,000 triennially) Perkins grant for tooling. (To be shared by both manual and CNC classes).
Reasoning:
MS Money is not keeping up with perishable tooling costs (cutting tools that wear down in the machining process). Students continue to use cutting tools long after they wear out. This causes poor finishes and makes holding industry standard tolerances and production rates impossible. Students currently run tooling at 50% of capacity to increase longevity and we still fall short. Non-perishable tooling needs to be upgraded to a higher quality (currently we buy the cheapest import tools) and standardized for interchangeability. Students often spend an hour or more looking for tooling components that “fit”. We need to meet minimum industry standards. An increase in exposure to modern cutting tools—i.e. – coated inserts – is critical to meet the needs of industry and to effectively market the Manufacturing Technology Program in order to increase enrollment.

4. Modernize room 112 to allow for increased enrollment in the CNC option by completing the following:
1. Extend the HVAC ductwork from room 113 to allow for appropriate temperature control and airflow. (Room 113 is on the office area HVAC system)
Temperature extremes in room 112 greatly reduce teaching effectiveness and student learning. Efforts by LCC facilities have been unsuccessful at solving the problem with the existing duct routing.
2. Provide ten Windows XP networked computers.
This will allow the use of Predator 3D solid model, CNC verification simulators, which will provide more efficient use of time on the CNC machilnes. This will also allow students to use Esprit CAM software at times when room 119 is being shred by other departments.

5. Mezzanine Classroom (Room 200, Bldg. 12) neseds to be enclosed.
Reasoning
Manufacturing lectures take place in a mezzanine area above the machine shop. All the machine shop activities and noise from the machine tools can be heard all too clearly by the students as they try to listen and take notes. The instructor must shout over the shop din presenting such topics as math, trigonometry, tool bid geometry and blueprint reading. It is trying and difficult for all. In addition, there is a safety concern. The existing one-half wall is very weak and minimally supported. A student could easily push it through and fall a full story to the concrete floor below**.**

6. Full-time faculty member

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Maintenance Initiatives

Initiative ID	Need	Request
MFG M01	Modernize room 112 to allow for increased enrollment in the CNC option by completing the following: 1. Extend the HVAC ductwork from room 113 to allow for appropriate temperature control and airflow. (Room 113 is on the office area HVAC system) Temperature extremes in room 112 greatly reduce teaching effectiveness and student learning. Efforts by LCC facilities have been unsuccessful at solving the problem with the existing duct routing. 2. Provide ten Windows XP networked computers. This will allow the use of Predator 3D solid model, CNC verification simulators, which will provide more efficient use of time on the CNC machilnes. This will also allow students to use Esprit CAM software at times when room 119 is being shred by other departments.	
MFG M02	Mezzanine Classroom (Room 200, Bldg. 12) neseds to be enclosed. Manufacturing lectures take place in a mezzanilne area above the machine shop. All the machine shop activities and noise from the machine tools can be heard all too clearly by the students as they try to listen and take notes. The instructor must shout over the shop din presenting such topics as math, trigonometry, tool bid geometry and blueprint reading. It is trying and difficult for all. In addition, there is a safety concern. The existing one-half wall is very weak and minimally supported. A student could easily push it through and fall a full story to the concrete floor below**.**	
MFG M03	Surface Grinder	$10,500
MFG M04	Collet closure (4)	$2,600
MFG M05	Kurt Vise (5)	$2,000
MFG M06	Mills (5)	$20,000
MFG M07	Lathes (14)	$84,000
MFG M08	Heat treat oven	$8,800
MFG M09	Bench tools (10)	$2,000

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Enhancement Initiatives

Initiative ID	Need	Request
E01	Two (2)-fulltime aides for Manufacturing 197, one instructional aide for shop maintenance. 1. Instructional: Classes are over full; One instructor teaches variable credit students with enrollment in 6 different terms with the lab and classroom lectures all happening concurrently. 2. Maintenance: The Manufacturing shop is over 10,000 square feet with 40 major machine tools and thousands of tools and tooling components. The students are hard on all the equipment and continual on-going maintenance is needed during and after classes. Safety issues are re-enforced with both aide positions.	
E02	One (1)-half-time aide for CNC/CAM classes 1. To provide for a constant source of teaching aide money to support the CNC/CAM instructor. This will make it possible to effectively cover instruction on the operation of the four CNC machines in room 107 and the same time. CAM is being taught in room 119	
E03	Increase the annual MS Money or provide for a large) Perkins grant for tooling. (To be shared by both manual and CNC classes). MS Money is not keeping up with perishable tooling costs (cutting tools that wear down in the machining process). Students continue to use cutting tools long after they wear out. This causes poor finishes and makes holding industry standard tolerances and production rates impossible. Students currently run tooling at 50% of capacity to increase longevity and we still fall short. Non-perishable tooling needs to be upgraded to a higher quality (currently we buy the cheapest import tools) and standardized for interchangeability. Students often spend an hour or more looking for tooling components that "fit". We need to meet minimum industry standards. An increase in exposure to modern cutting tools—i.e. – coated inserts – is critical to meet the needs of industry and to effectively market the Manufacturing Technology Program in order to increase enrollment.	$10,000 triennially

E04	Harrison Lathe (5)	$67,500
E05	Bridgeport Mills (3)	$41,400
E06	CNC Fryer mill	$60,000
E07	CNC rhino lathe	$8,000
E08	CNC super max mill	$30,000
E09	CNC mori lathe	$86,000

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Division/Unit	Initiative ID	Division Priority	Date of Initiative	Expected completion date	Initiative Description	Resource Description	$$	Recurring / Nonrecurring	Resource Type (mark with an "X")				Fund (mark	
									Payroll (w/OPE)	Equipment	Space	Other	Existing	New G-F
Manufacturing	E01	1	1/9/04	6/30/05	New Equipment	2 full time aides for MFG 197		R	x					1
Manufacturing	E02	2	1/9/04	6/30/05	New Equipment	Harrison Lathe (5)	67,500	NR		x				2
Manufacturing	E03	3	1/9/04	6/30/05	New Equipment	Bridgeport Mills (3)	41,400	NR		x				3
Manufacturing	E04	4	1/9/04	6/30/05	New Equipment	CNC Fryer mill	60,000	NR		x				4
Manufacturing	E05	5	1/9/04	6/30/05	New Equipment	CNC rhino lathe	8,000	NR		x				5
Manufacturing	E06	6	1/9/04	6/30/05	New Equipment	CNC super max mill	30,000			x				6
Manufacturing	E07	7	1/9/04	6/30/05	New Equipment	CNC mori lathe	86,000	NR		x				7
Manufacturing	E08	8	1/9/04	6/30/05	New Equipment	1 instructional aide for shop maintenance	15,840	R	x					8
Manufacturing	E09	9	1/9/04	6/30/05	New Equipment	1 half time aide for CNC/CAM	15,840	R	x					9
Manufacturing	M01	10	1/9/04	6/30/07	Replacement Equipment	Increase annual MS Monies for tooling. To be shared by manual and CNC classes	10,000	R		x				10
Manufacturing	M02	11	1/9/04	6/30/05	Replacement Equipment	Modernize room 112	50,000	NR		x	x			
Manufacturing	M03	12	1/9/04	6/30/05	Replacement Equipment	Enclose Mezzanine classroom	30,000	NR						
Manufacturing	M04	13	1/9/04	6/30/05	Replacement Equipment	Surface Grinder	10,500	R		x			1	
Manufacturing	M05	14	1/9/04	6/30/05	Replacement Equipment	Collet closure (4)	2,600	R		x			2	
Manufacturing	M06	15	1/9/04	6/30/05	Replacement Equipment	Kurt Vise (5)	2,000	R		x			3	
Manufacturing	M07	16	1/9/04	6/30/05	Replacement Equipment	Mills (5)	20,000	NR		x			4	
Manufacturing	M08	17	1/9/04	6/30/05	Replacement Equipment	Lathes (14)	84,000	NR		x			5	
Manufacturing	M09	18	1/9/04	6/30/05	Replacement Equipment	Heat treat oven	8,800	NR		x			6	
Manufacturing	M10	19	1/9/04	6/30/05	Replacement Equipment	Provide12 Windows XP networked computers.	14,500	R						
Manufacturing	E10	20	1/9/04	6/30/05	New Equipment	Curriculum development 80 hrs	2,000	R						
Manufacturing	E11	21	1/9/04	6/30/05	New Equipment	FT Faculty	75,000	R						11
Manufacturing	M10	22	1/9/04	6/30/05	Replacement Equipment	Bench tools (10)	2,000	R		x			7	