

SAULT COLLEGE  
of Applied Arts and Technology  
Sault Ste. Marie

COURSE OUTLINE

MECHANICAL DRAWING & DESIGN

DRF 215-5

Mechanical Drafting Technician

Semster 4

revised June, 1980 by C. Rising

Engineering Drawing & Design

DRF 215-5

Textbooks & Reference Books

Mechanical Engineering Handbook (Kent)  
Machinery Handbook  
C.S.A. Drawing Standards  
Mechanisms (Faires & Keowin)  
Worms & Worm Gears (Boston Gear)  
Principles of Mechanical Design (Parr)  
Technical Drawing (Giesecke)  
Mechanical Drawing SI Metric (McGraw-Hill)  
Fastener Standards  
Metals Handbook (ASTM)  
Manufacturers Catalogues  
Bearing Technical Journal  
Link Belt Standard Products

MECHANICAL DRAFTING TECHNICIAN

DRAFTING

Fourth Semester DRF 215-5

Topic No.	Periods	Topic Description	Reference
1	10	<p><u>Checking of Drawings</u></p> <p>select industrial drawing (general arrangement plus detail drawings) check completely, and produce notes and corrections where necessary</p>	
2	8	<p><u>Tolerances</u></p> <p>analysis of geometric, true position and stack tolerancing from given detail drawings and respective sub-assembly drawings. Correct where necessary</p>	
3	6	<p><u>Fits</u></p> <p>determination of stress induced and temperature change required for interference fits. If necessary make recommendations with respect to material selection</p>	
4	10	<p><u>Bearings</u></p> <p>Plain: Friction, lubrication, properties of bearing materials. Determination of bearing dimensions for given conditions</p> <p>Roller: Terminology. Selection for specified conditions and life expectancy. Lubrication</p>	
5	6	<p><u>Shaft Design</u></p> <p>make necessary calculations and sketches for the design of shafts and couplings from given information</p>	
6	8	<p><u>Design Simplification</u></p> <p>analysis of given detail drawings and recommendations for component simplification</p>	
7	8	<p><u>Mechanism</u></p> <p>preparation of drawings indicating motion obtained within a mechanism</p>	

## DRF 215-5

Topic No.	Periods	Topic Description	Reference
8	20	<u>Design Project</u> mechanical design using given specifications preparation of all working drawings and completion of calculations where necessary	
9	20	<u>Design Project</u> hydraulic design: design a hydraulic system in conjunction with hydraulics course. prepare all necessary drawings and include necessary calculations	

Mechanical Drafting Technician

Engineering Drawing & Design

DRF 215-5

PERFORMANCE OBJECTIVES:

General Objectives:

To develop further the use of Engineering Drawing as a language of communication.

To expand into the field of fundamental techniques of design, including material selection, use of reference material and catalogue information.

In addition to the above the student will be required to demonstrate an ability to use knowledge gained in other areas of study in order to complete various aspects of assigned work.

The following more specific objectives relate to what the student shall be able to do, apply, determine, analyze and communicate.

UNIT 1

1. Identify the purpose of engineering design.
2. Identify the necessity of having good channels of communication between design, production, sales, and manufacturing departments.
3. Demonstrate ability to provide for good communications.

UNIT 11

4. Identify the need for the checking of drawings.
5. Demonstrate ability to methodically check drawings including assembly and detail drawings.
6. Identify the need and demonstrate ability to systematically note and correct errors when checking drawings.
7. Analyze and put forth arguments from a personal viewpoint with respect to the advantages and disadvantages of a component's features and functions.

UNIT 111

8. Demonstrate ability to use reference materials for selection of limits fits and tolerances. e.g. C.S.A. publications.
9. Prove the validity of given applied tolerances with respect to:
  - a) geometric tolerancing
  - b) true positional tolerancing
  - c) tolerance stacking

10. Identify the above tolerance applications and apply them to his/her work in order to provide for correct assembly and working conditions.
11. Demonstrate ability to recognize faults in tolerance applications and dimensioning methods.
12. Demonstrate ability to rectify faults such as those encountered in S.O. 11.
13. Evaluate induced stress due to interference fits.
14. Evaluate temperature increase required for shrink fits.

#### UNIT IV

15. Identify the purpose of bearings.
16. Identify the need for various types of bearing materials.
17. Identify the purpose of bearing lubrication.
18. Identify methods of bearing lubrication.
19. Identify the need for various types of bearings.
20. Demonstrate ability to recognize types of plain bearings and situations where they will be used.
21. Demonstrate ability to determine the intensity of bearing stress.
22. Demonstrate ability to determine the frictional force in a bearing.
23. Demonstrate ability to determine the frictional torque in a bearing.
24. Demonstrate ability to determine work done against friction in a bearing.
25. Demonstrate ability to determine Horse Power lost due to friction in a bearing.
26. Identify the relationship between life, load and capacity for bearings.
27. Identify use of Rotation factor V for bearings.
  - 1.0 for inner ring rotation
  - 1.2 for outer ring rotation
28. Demonstrate ability to determine specific dynamic capacity of a bearing.
29. Demonstrate ability to determine the equivalent load on a bearing.
30. Demonstrate ability to work from given information of bearing working conditions in order to select the correct bearing from manufacturers catalogues.

UNIT V

31. Identify the need for a sound knowledge of strengths and properties of materials in mechanical design problems.
32. Demonstrate ability to trace load transmission.
33. Demonstrate ability to perform a relatively simple stress analysis.
34. Demonstrate ability to produce a diagram indicating type of failure tending to occur at various points in S.O. 33.
35. Demonstrate ability to use S.O. 31 to S.O. 34 to design a simple joint e.g. Pin Joint from given information.
36. Demonstrate ability to use reference text, e.g. Mechanical Engineers Handbook (Kent), to extract relevant information for the design of a similar joint to that in S.O. 35.
37. Apply information obtained from S.O. 35 and S.O. 36 to make assembly and complete detail drawings of the designed joint.
38. Analyze given information to determine if a shaft is in simple torsion.
39. Analyze given information to determine if a shaft is in simple bending.
40. Analyze given information to determine if a shaft is in Torsion and Bending.
41. Demonstrate ability to determine torsion in a shaft.
42. Demonstrate ability to determine bending in a shaft.
43. Demonstrate ability to determine the Equivalent Twisting Moment in a shaft.
44. Demonstrate ability to determine Horse Power transmitted by a shaft.
45. Demonstrate ability to make comparisons between solid and hollow shafts.
46. Analyze given information in order to design a shaft.
47. Identify the need for shaft couplings.
48. Demonstrate the ability to design, from given information, a coupling for a shaft.

UNIT VI

49. Identify the need for component design simplification.
50. Identify the economy of saving on machined areas.
51. Identify the economy of avoidance of small tolerances.
52. Identify the simplification by separation, under certain circumstances, of one component into 2 or more components.

53. Identify the simplification of amalgamation of components into one component.
54. Analyze given information with respect to S.O. 49 to S.O. 53 and identify a need for simplification with respect to various components.
55. Identify the necessity of determining that after simplification the modified component must exactly fulfil the function of the displaced component.
56. Identify the need to communicate with all affected departments with respect to changes made in any component.

#### UNIT VII

57. Demonstrate ability to identify the motion produced by links.
58. Demonstrate ability to identify the motion produced within a mechanism.
59. Analyze given written or oral information, use this to design and produce working drawings of components to give the desired motion within a mechanism.

#### UNIT VIII

60. Identify the need for hydraulic systems.
61. In conjunction with applied hydraulics course, demonstrate ability to identify various hydraulic components and their uses.
62. Identify the meaning of various hydraulic symbols.
63. Demonstrate ability to use knowledge gained in hydraulics course in order to design an hydraulic system.
64. Demonstrate ability to produce necessary calculations required for S.O. 63.
65. Demonstrate ability to produce a schematic drawing of design from S.O. 63.
66. Demonstrate ability to use manufacturers or suppliers catalogue to call for the components required for S.O. 63.
67. If necessary produce an installation drawing for S.O. 63.