COURSE CODE:	*MCE 312*
COURSE TITLE:	*Workshop Practice II*
NUMBER OF UNITS:	*6 Units*
COURSE DURATION:	*One hour Lecture & Two hours practical per week*

COURSE DETAILS:

Course Coordinator:	**Kuye S. I.,** B.Eng, M.Sc.
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Office Location:	**MCE Dept., COLENG**
Other Lecturers:	**None**

COURSE CONTENT:

Continued development of machine shop and tool room practice, as well as continued development of sheet metal and wood working practice.

COURSE REQUIREMENTS:

This is a compulsory course for all students in the College. Students are expected to participate in all the course activities and have minimum of 75% attendance to be able to write the final examination. In addition students are required to take part in the laboratory practicals. Everything sums up to give the final score.

READING LIST:

LECTURE NOTES

SHEET METAL OPERATIONS

- Many engineering components are produced from flat sheet metals
- Sheet metal cut to shape and folded to form finished article
- Edges are then secured by methods such as welding, brazing, soldering and riveting.
- Accuracy of size, shape and otherwise of finished article depends upon the development.
- Allowance for folding and bending depends on the radius of the bend and the metal thickness.
- Thickness of sheet metal is identified by a series of numbers known as standard wire gauge, or s.w.g. or simply put 'gauge'.

1.2 **Marking Out**

Most articles will require their outlines to be marked out together with the location of any functional features including hole centres, bend lines, etc. These outlines scribed on the work piece assist the machinist to set up the work in his machine. However, marking out is employed when the number of similar parts to be employed is not great. For large quantities, marking out would be waste of time and expense; in such cases it is eliminated by holding the component while machining in a jig or fixture, which locates it in correct position and provides some means for guiding the tool cutter in the proper path.

Marking Out Equipment

(a) Surface table
(b) Surface plates
(c) Parallels
(d) Angle plate
(e) Vee block
(f) Engineer's square
(g) Combination set
    (i) Protractor head
    (ii) Square head

(iii) Centre head
(h) Marking dye
(i) Chalk line
(j) Dividers and trammels
(k) Hermaphrodite callipers
(l) Scriber
(m) Precision steel rule
(n) Surface gauge
(o) Back gauge
(p) Centre punches
(q) Pencils

1.2 **Cutting Sheet Metal**

Tools

(a) Snips
(b) Bench Shears
(c) Guillotine
(d) Q-max Cutter

1.3 Bending Sheet Metals

Tools

(a) Fly press
(b) Vice
(c) Folding machines

1.4 **Development**

The development of sheet-metal components ranges from the simple to the extremely complex. If a cylinder is unfolded, like unrolling a carpet, the length of the development is equal to the circumference. If a cone is unfolded while pivoting about the apex, the development is a segment of a circle whose arc is equal in length to the circumference of the base.

1.5 **Stiffening**

For the efficient use of materials and the manufacture of a low cost product, it is often required to use the thinnest sheet, plate or section possible, enabling it to be more easily cut and formed. However, one of the major disadvantages of thin sheet and section as a structural member is that if not reinforced it tends to deflect, sag or buckle under the action of compressive stresses; and with thin walled open section, in addition to bending, twisting generally occurs.

Importance of Stiffening

(i) Structural
- (a)Strength
- (b) rigidity

(ii) Non-structural
- (a)economy
- (b) safety
- (c) appearance

Methods of stiffening

(a) Wired edge
(b) Folded edge
(c) Swaging

1.6 **Joining Methods**

(a) Mechanical fasteners; screws, bolts, nuts, rivets

(b) Brazing

(c) Welding

(e) Adhesive bonding

1.7 **Other Sheet Metal Operation**

Deep drawing

- Used for shaping flat sheets into cup shaped articles such as bath tubs, cartridge cases
- Achieved by placing a blank over a shaped die and pressing the metal into the die with a punch.
- Hold down pressure is required to press the blank against the die to prevent wrinkling

2.0 WOODWORK PRACTICE

2.1 Simple Joints in Woodwork

This knowledge is essential in assembling and fastening two or more pieces of wood together. This art is known as joinery. So many joints are used in wood construction. They are as follow:

(i) Butt joint
(ii) Halving joints
  (a)Corner halving joint
  (b)Tee halving joint
  (c)Cross-halving joint
  (d)Dovetail tee halving joint
  (e)Mortise and tenon joint
  (f) Bridle joint
  (g) Plain tee bridle joint
  (h) Corner bridle joint
  (i) Tongued and groove joint

2.2 Adhesive

- ✓ This is any substance capable of holding or bonding two or more pieces of materials together.

- ✓ Very important in the woodwork industry for furniture construction, fixing of joints permanently as well as gluing other materials such as wood to metal, plastic to wood, and cement to metal

Preparing wood pieces for gluing

- Pieces to be glued should be dry
- Faces to be joined should be clean, free from dust, grease and perfectly flat
- Parts should fit perfectly together
- Parts glued should be clamped properly for a required period of time, if necessary
- Excess glue should be cleaned before it sets and becomes hard

2.3 Abrasive

- ✓ This is a paper or cloth coated with hard minerals producing multipoint cutting edges that wear away the surfaces of other materials by rubbing
- ✓ When it is used for smoothing wood, the process is called sanding, though sand is not used
- ✓ It can be graded as: very fine, fine, medium, coarse and very coarse
- ✓ Waterproof glues such as melamine, formaldehyde, etc are used for bonding abrasives.