

## BENT409 Engineering Manufacturing Processes

ECTS Value: 5 ECTS  
Self-Study Hours: 64

Contact Hours: 25  
Assessment Hours: 36

### Overall Objectives and Outcomes

Engineering Manufacturing processes are required to convert materials into viable products such as food packaging, furniture, metal fittings, tools, children's toys and bottles. This module will start by looking at the processes used for the manufacturing of products using polymers including Thermoplastics and Thermosetting materials. The next part of the module will look into metal processes, which are involved in the manufacturing of processes using metals. The student will also learn about manufacturing processes used for the manufacturing of wooden products. The unit will also look into advanced manufacturing processes used in modern factory processes to mass produce goods.

By the end of this module, the learner will be able to:

### Competences

- a. evaluate the best processes needed to mould different types of plastics;
- b. develop knowledge of methods of casting and shaping of metals;
- c. design methods of joining pieces of metal together;
- d. design the process to manufacture wooden products starting from the felling, conversion and seasoning of wood.

### Knowledge

- a. classify the principles used in the shaping processes used for Plastics;
- b. appraise the process and equipment used for Injection Moulding;
- c. critically evaluate the Compression and Transfer Moulding processes in the shaping of Plastics;
- d. describe the blow moulding and rotational moulding processes;
- e. Outline methods of welding, Brazing, and Soldering for particular tasks;
- f. evaluate the processes used to manufacture wooden products starting from the felling, conversion and seasoning of Wood.
- g. describe the principles of heat treatment of Metals including annealing and hardening processes;
- h. describe the equipment and processes needed for the metal rolling processes;
- i. define the principles of metal extrusion processes including hot and cold extrusion processes;
- j. define Adhesive Bonding;
- k. outline the various mechanisms used in mechanical assembly including mechanical fastening methods, threaded fasteners and riveting;
- l. describe the principles used for advanced machining processes including chemical, electrochemical, electrical discharge, laser beam, electron beam, water jet, abrasive jet and Hybrid machining;
- m. outline the processes and machinery required for panel processing and wood product finishing.

## Skills

- a. show how powder metallurgy can be used in manufacturing;
- b. select the best processes required to produce particular parts using the designated material;
- c. Assess the fundamentals of metal casting processes;
- d. recognise Processes of solid wood processing and Panel processes required to produce particular wooden products.
- e. Apply knowledge of materials to design and set up the best manufacturing processes possible for particular materials.

## Assessment Methods

This module will be assessed through: Research Assignment (50%), Presentation (20%), Practical assignment (30%)

## Suggested Readings

### Core Reading List:

1. Groover Mikell P., (2012). Fundamentals of Modern Manufacturing. Materials, Processes and systems. Wiley.
2. Kalpakjian Serope, Schmid Steven, (1992) Manufacturing Engineering and Technology. Addison Wesley
3. Secondary Wood Processing – Manufacturing Processes 2012. Retrieved from, <http://wood120.forestry.ubc.ca/files/2012/08/Wood-120-Lec-3-Secondary-2012-Compatibility-Mode.pdf>
4. Singh Rajender, (2006). Introduction to Basic Manufacturing Processes and Workshop Technology. New Age International.

### Supplementary Reading List:

1. Gupta, K. (Ed.). (forthcoming 2019). Innovations in Manufacturing for Sustainability (Materials Forming, Machining and Tribology). Springer.
2. Swift, K.G. and Booker, J.D. (2013). Manufacturing Process Selection Handbook. Butterworth-Heinemann
3. Huang, Y. and Wang, L., Liang, S.Y. (forthcoming 2019).
4. Oye Ibidapo-Obe, O., Ayeni, B.J., and Badiru, A.B. (forthcoming 2019). Handbook Of Manufacturing Manufacturing and Enterprise: An Integrated Systems Approach (Systems Innovation Book Series). CRC Press.