MME 308 - Foundry technology 1

**COURSE PARTICULARS**

Course Code: MME 308  
Course Title: Foundry technology 1  
No. of Units: 3  
Course Duration: Two hour of theory and one hour of practical per week for 15 weeks.  
Status: Compulsory  
Course Email Address: soseidu@futa.edu.ng  
Course Webpage: http://www.mme.futa.edu.ng/courseschedule.php?coursecode=FWT%20204  
Prerequisite: NIL

**COURSE INSTRUCTORS**

Dr S. O. Seidu  
*Room 204, SEET Building,  
Dept. of Metallurgical and Materials Engineering,  
Federal University of Technology, Akure, Nigeria.*  
Phone: +2348137724379  
Email: soseidu@futa.edu.ng

**COURSE DESCRIPTION**

This course is one of the major courses in metallurgical engineering; it is the first course that is primarily design to expose the students to metallurgical processes. Students will be provided with hands-on training on moulding and casting technologies. The major focus is to train and guide the student on how to practice it so as to be independent because the course is basically practical. Topics to be covered include metal fluid flow principles; pattern, core and mould making processes; Ferrous and non-ferrous casting processes; basic heat treatment processes and refractory metals.

**COURSE OBJECTIVES**

The objectives of this course are to:  
- advance the technology related to the manufacturing and use of metal castings through education and training and
- understand the fundamental principles and basic operations of industrial used casting processes.

**COURSE LEARNING OUTCOMES / COMPETENCIES**

Upon successful completion of this course, the student should:

*(Knowledge based)*

- have fundamental knowledge of possibilities of using castings in different practical applications from their design and material point of view;
- understand different types of pattern, core and mould making processes;
- have basic knowledge of casting and precision casting technology;
- have fundamental idea of corrosion engineering and heat treatment processes;
- understand the differences in metals according to their melting temperatures; and
- learn more by themselves and develop their scientific and technical competencies in the fields of foundry

**GRADING SYSTEM FOR THE COURSE**

This course will be graded as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Attendance</td>
<td>10%</td>
</tr>
<tr>
<td>Assignments</td>
<td>10%</td>
</tr>
<tr>
<td>Test(s)</td>
<td>20%</td>
</tr>
<tr>
<td>Final Examination</td>
<td>60%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

**GENERAL INSTRUCTIONS**

*Attendance:* It is expected that every student will be in class for lectures and also participate in all practical exercises. Attendance records will be kept and used to determine each person’s qualification to sit for the final examination. In case of illness or other unavoidable cause of absence, the student must communicate as soon as possible with any of the instructors, indicating the reason for the absence.

*Academic Integrity:* Violations of academic integrity, including dishonesty in assignments, examinations, or other academic performances are prohibited. You are not allowed to make copies of another person’s work and submit it as your own; that is plagiarism. All cases of academic dishonesty will be reported to the University Management for appropriate sanctions in
accordance with the guidelines for handling students’ misconduct as spelt out in the Students’ Handbook.

**Assignments and Group Work:** Students are expected to submit assignments as scheduled. Failure to submit an assignment as at when due will earn you zero for that assignment. Only under extenuating circumstances, for which a student has notified any of the instructors in advance, will late submission of assignments be permitted.

**Code of Conduct in Lecture Rooms and Laboratories:** Students should turn off their cell phones during lectures. Students are prohibited from engaging in other activities (such as texting, watching videos, *etc.*) during lectures. Food and drinks are not permitted in the laboratories.

---

### READING LIST


**Legend**

1- Available in the University Library  
2- Available in Departmental/School Libraries  
3- Available on the Internet.  
4- Available as Personal Collection  
5- Available in local bookshops.
## COURSE OUTLINE

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>• Introduction – Present status and scope of foundry industry in Nigeria</td>
<td>During this first class, the expectation of the students from the course will also be documented.</td>
</tr>
</tbody>
</table>
| 2 & 3| • History and Development of metal casting.  
• Solidification metal flow principles  
• Alloying elements effect.  
• Properties of fine and coarse – grained steels. | Background of foundry works and basic gating system principles will be discussed. Additives effects on the metal will not be left out. |
| 4 & 5| • Pattern making: Differences between pattern and casting.  
• Tolerance calculation in pattern making: method and economics.  
• Pattern types.  
• Methods of pattern forming | The ABC of making various pattern couple with basic design considerations that should be put in place will be discussed. |
| 6    | • Moulding and core making: Properties of good molding sand.  
• Types of moulding sands, moulding processes. CO₂ processes. | There will be a workshop practice on core and core box making. |
| 7 & 8| • Typical moulding problems and remedies.  
• Moulding tools.  
• Introduction to castings processes: Gravity die casting, squeeze casting, investment casting, sand casting, expanded polystyrene for iron, steel and non-ferrous castings | Student will be divided into groups and they will be required to make a mould and casting processes will be demonstrated at the workshop |
| 9 & 10| • Centrifugal casting  
• Degasification of metals.  
• Introduction to Metallurgy.  
• Hardening of metals Deformation and annealing of metals | Basic knowledge of metallurgy brief introduction to heat treatment of metals will be discussed. |
<table>
<thead>
<tr>
<th></th>
<th>11 &amp; 12</th>
<th>13 &amp; 14</th>
<th>15</th>
</tr>
</thead>
</table>
|     | • Corrosion and oxidation phenomena.  
|     | • Alloy steels. Stainless, creep and heat resisting steels.  
|     | • Cast irons | Students will be introduced to basic corrosion engineering and different cast irons |
|     | • Metallurgical aspect of metal joining  
|     | • Electrical and magnetic alloys. Copper and its alloys. Aluminium and its alloys.  
|     | • Magnesium and light alloys. Titanium and its alloys.  
|     | • Refractory metals | Metal joining processes and some non-ferrous metal and their alloys will also be discussed. |
|     | **REVISION** | This is the week preceding the final examination. At this time, evaluation will be done to assess how far the students’ expectations for the course have been met. |