Dental materials has always been a fascinating and challenging area for the dental technicians. During the past several years dental materials science has undergone a virtual explosion of new knowledge. The advent of new polymeric and ceramic restorative systems, bonding and adhesive materials, implant materials, glass ionomer cements, precious and non-precious metal restorative systems and impression materials have virtually revolutionized the practice of modern dental technology. Therefore, dental technician uses the largest number of materials from different classes.
Technicians fabricate different appliances and different restorations that they should be functionally acceptable and esthetically pleasing manner.

This course is meant to teach the student of dental technology program aspects of materials science necessary to enable him to understand and continue to learn dental biomaterials. Also, to develop an appropriate understanding of the criteria for the selection and manipulations of different materials for specific dental procedures.

II. Course Educational Goal

The student will be exposed to those aspects of materials science applicable to clinical dental practice and will understand the basic scientific principles pertaining to proper manipulation of Dental Biomaterials.

1. The student will have a working knowledge of the nature, structure and properties of metals, polymers and ceramics as they apply to dental practice.

2. The student will be able, upon completion of this course, to justify selection of the most appropriate materials possession the physical properties that are suitable for a particular functional situation.

3. The student will appreciate the underlying principles for the strengthening of materials and the need for specific laboratory and clinical manipulation.

4. The student will be capable of rationally consider new dental materials as they are developed during his professional career.

5. The student will be able to manipulate most of the dental materials used in the Lab.

III. Course Outline

1. Introduction – Materials in Dentistry

2. Structure of Matter
3. Atomic bonding

4. Structure of Matter

5. Structure of Matter (Crystalline defects)

6. Physical Properties (mass related properties)

7. Physical Properties (thermal properties)

8. Physical Properties (electrical properties)

9. Physical Properties (light related properties)

10. Mechanical Properties I

11. Mechanical Properties II

12. Mechanical Properties III

13. Time-Dependent Mechanical Properties IV

14. Chemical properties I

15. Chemical properties II
16. Phase Diagrams I

17. Soldification and Microstructure I (Solution Hardening)

18. Soldification and Microstructure II (Mechanisms of hardening)

19. Soldification and Microstructure III

20. Ceramics (Basic nature)

21. Ceramics in Dentistry

22. Polymers (Basic concepts – Polymer, mer, monomer)

23. Polymers in Dentistry

23. Comparison between Metals, Ceramics, and Polymers

24. Biomechanics I (Fixed prosthetic restoration)

25. Biomechanics II (Removable prosthodontics)

26. Biological Considerations
28. Failure of Materials in the Oral Cavity

IV. Student Evaluation

The students shall have two written continuous assessments, one written midterm exam, and one final exam.

The assessments and the midterm exams counts for 50% of the grade. The final exam shall count for 40% of the grade.

Evaluation of the practical part count for 10% of the grade. The students shall have an oral exam to identify different dental materials.

V. Principal Reference

- Contemporary Dental Materials, Dhuru
- Handouts shall be given.