Addis Ababa University Addis Ababa Institute of Technology School of Chemical and Bio-Engineering			
Course Title	**Mechanical Unit Operations**	**Course Number**	**CBEg2105**
ECTS	**7**	**Academic Year**	**2019/2020**
Course Syllabus			

Course Objectives:

- The concept of particle technology
- Size reduction equipments and their working principle
- Mechanical separation equipments and application
- Mixing process and equipment
- Techniques of agglomeration
- Types of transportation and storage of solid bulks in chemical process industry

Course Description/Course Contents

1. **Particle Technology**
   - 1.1. Particle size and shape
   - 1.2. Mixture of particles and Particle size distribution
2. **Size Reduction**
   - 2.1. Mechanism of size reduction
   - 2.2. Materials properties
   - 2.3. Energy and power requirement for size reduction
   - 2.4. Size reduction equipments
3. **Agglomeration (Size enlargement)**
   - 3.1. Binding forces
   - 3.2. Strength of agglomerates
   - 3.3. Equipment for size enlargement
4. **Mechanical Micro-process in a fluid**
   - 4.1. Particle dynamics
   - 4.2. The drag forces
   - 4.3. Flow of fluid through a granular beds
   - 4.4. Packed and fluidized bed
5. **Mechanical and Hydro –Mechanical Separations**
   - 5.1. Screening
   - 5.2. Sedimentation: thickening and clarification
   - 5.3. Filtration in solid liquid separation
   - 5.4. Centrifugal separations
   - 5.5. Other separation techniques
6. **Mixing Process and Mixers**
7. **Handling and Transportation of Solids**

Reference books

1. W.L.McCabe, J.C. Smith and P. Harriott: Unit operation of Chemical Engineering, 5th editions,1993.
2. R, J.McDonough: Mixing for the process industries, 1992.
3. M. Coulson and J.T. Richardson: Chemical Engineering, volume 1 and 2.
4. Ullmann's Encyclopedia of Chemical Engineering, vol.2, 5th edition, 1988.
5. W.L.Badger and J.T.Bandero: Introduction to Chemical Engineering, 1987
6. Perry's Chemical Engineering Handbook
7. F.A. Holland: Fluid flow for chemical engineering,1973