

## Course Description:

Year 3	Semester 1
<b>Course code:</b>	PM 3125
<b>Course title:</b>	Pharmaceutical Technology 1
<b>Course leader:</b>	
<b>Hours:</b>	45 h lectures + 30 h practicals
<b>Lectures:</b>	45 h
<b>SGD</b>	
<b>SDL</b>	
<b>Practicals:</b>	30 h
<b>Tutorials:</b>	
<b>Assignments:</b>	
<b>Credits</b>	04
<b>Aims and rationale:</b>	To introduce concepts of mass transfer, heat transfer, drying, mixing, filtration, evaporation, compression and compaction. To introduce concepts of industrial safety methods.
<b>Learning outcomes:</b>	To describe the concepts of mass transfer, heat transfer, drying, mixing, filtration, evaporation, compression and compaction for manufacturing pharmaceutical formulation.
<b>Learning strategy:</b>	
<b>Teaching strategy:</b>	Lectures, SGD, practicals
<b>Assessment and Evaluation:</b>	
<b>Criteria</b>	
<b>Content:</b>	<ol style="list-style-type: none"> <li>1. Heat transfer: source of heat, heat transfer, steam and electricity as heating media, determination of requirement of amount of steam/electrical energy, steam pressure and mathematical problems on heat transfer</li> <li>2. Mass transfer: concept and theory</li> <li>3. Drying: moisture contents, mechanism of drying, rate of drying, time of drying, calculation, classification, types of dryers, dryers used in pharmaceutical industry, special drying methods, mathematical problems on drying</li> <li>4. Mixing: theory, factors affecting mixing, mechanism, mixers of liquid, solids and semisolid mixing.</li> <li>5. Filtration and centrifugation: Theory of filtration, filter aids, filter media, industrial filters including filter press, rotary press, rotary filter, edge filter etc., Factors affecting filtration, mathematical problems on filtration, optimum cleaning cycle in batch filter, principles of centrifugation, industrial centrifugal filters and centrifugal sedimenters.</li> <li>6. Evaporation and distillation: Basic concepts phase equilibrium, factors affecting evaporation, evaporators, film evaporators, single effect and multiple effect evaporators and mathematical problems on evaporation, distillation methods.</li> <li>7. Particle size separation: different techniques of size separation, sieves and sieve shakers, mechanical classifiers, air separators</li> <li>8. Compression and compaction: solid-air interface, angle of repose, flow rates, mass-volume relationship, density, heckel plots, consolidation, friability, compression.</li> <li>9. Industrial hazards and safety precautions: mechanical, chemical, electrical, fire and dust hazards, industrial dermatitis, accident records etc.</li> </ol>
<b>Practicals</b>	<ol style="list-style-type: none"> <li>1. Experiments related to heat transfer and mass transfer</li> <li>2. Compression of granules to tablets</li> <li>3. Application of spray drying</li> <li>4. Determination of angle of repose</li> <li>5. Operation of sieve shaker and sieve analysis of powders and granules</li> <li>6. Operation of dryers and mixers</li> <li>7. Effect of filter aids on filtration rate</li> </ol>

<b>Reference Books</b>	<ol style="list-style-type: none"><li>1. Introduction to chemical engineering by Walter L Badger</li><li>2. Cooper and Gunns' tutorial pharmacy</li><li>3. Theory and practices of industrial pharmacy by Lachman</li><li>4. Pharmaceutical engineering by K Sabarmurthy</li><li>5. Remington Pharmaceutical Sciences</li><li>6. Bentleys' pharmaceutical textbook by CBS publishers and distributors, New Delhi, 1986</li><li>7. Good Pharmaceutical Manufacturing Practice by John Sharp</li></ol>
<b>Websites</b>	